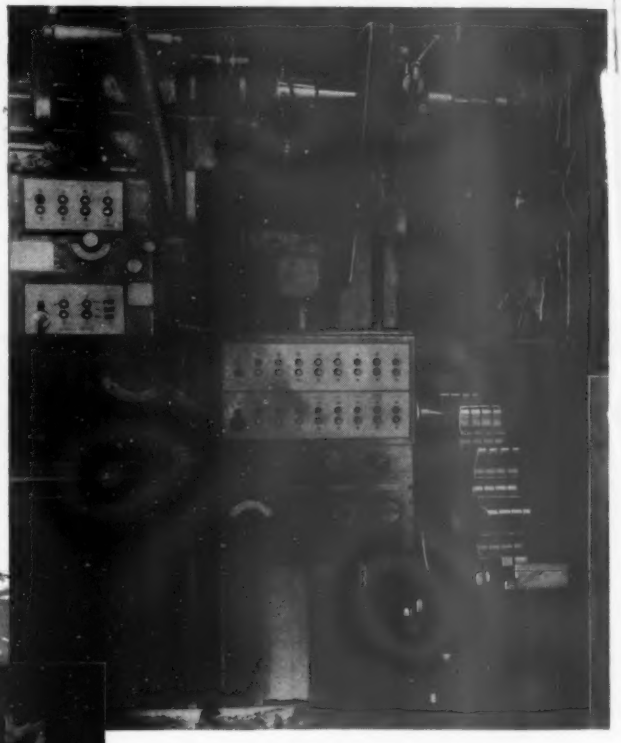
The TOOL ENGINEER
MACHINERY • PRODUCTION • TOOLS

Official Publication AMERICAN SOCIETY OF TOOL ENGINEERS

If Cars must become Tanks

shapes will change

but the same Keller Machines will be on the job.



Above: Keller makes a profiling cut. Tracer following a metal template guides cutter through the production of *four* tank track drive sprockets simultaneously.

Left: Three stages of a Keller-made tank sprocket; peace or war, Keller is ready to speed up the work.

AS American rearmament starts toward reality, fast footwork is required of industrial management . . . *and of industrial production facilities.* Life-saver for a tough situation in many plants is the Keller Machine, P&W basic tool whose function is "cutting two and three-dimensional shapes in metal."

The Keller is a mechanical-electrical hook-up through which a tracer passing over the surface of a model causes a cutter to reproduce the identical shape in any desired metal. The Keller was designed for primary use as a die sinker; but if cars must become tanks, versatile Keller Machines will speed into production of new dies . . . economically, accurately, rapidly. Or they will become *production* units, machining parts from master forms.

Invaluable additional service of the Keller Machine is its production of experimental parts in the actual size, shape, and material to be used in the finished part, directly from a wood or cement or plaster model. These parts can then be tested in use, analyzed, dissected.

Keller Machines cut down time and cost in getting a manufacturing program under way . . . an essential requirement in these fast moving days. Consult any P&W representative, or write to West Hartford for complete details.

PRATT & WHITNEY

Division Niles-Bement-Pond Company • West Hartford, Connecticut, U. S. A.

22,035,466 stiff impacts . . .
and not a sign of injury!

● A "STANDARD" DIAL INDICATOR equipped with our new SHOCK-PROOF MECHANISM was taken out of stock and placed on an impact testing machine.

● During 2700 consecutive hours, over 22 million blows struck the measuring spindle of the Indicator. Far heavier and sharper blows than the spindle likely would encounter anywhere in actual service!

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● N. B.—The millions of repeated shocks given under this brutal punishment were harmlessly absorbed by the shock-proof construction before they could reach the measurement mechanism.

Standard Gage Company, Inc.
80 Parker Avenue, Poughkeepsie, N. Y.

STANDARD *Gages*

1544

HOLO-KROME
SOCKET SCREW PRODUCTS

BOOTH 156

A dramatic animated display

unfolding the story of
HOLO-KROME FIBRO FORGED
TRADE MARK
Socket Screws

Unretouched Photo Etched, Cutaway, Socket Head Cap Screw

Stop and see us

MACHINE & TOOL PROGRESS EXHIBITION
CONVENTION HALL, DETROIT, MICH.
MARCH 25-26-27-28-29, 1941

HK HOLO-KROME
fibro forged
TRADE MARK

THE HOLO-KROME SCREW CORP. **SOCKET SCREWS** HARTFORD, CONN. U.S.A.

THE TOOL ENGINEER

"America in the Making"

CONTENTS OF VOLUME X NUMBER 2

February ,1941

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Published by
THE BRAMSON PUBLISHING CO.
2842 W. Grand Boulevard
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"PARAFORM" HEAVY-DUTY SPIRAL MILLING CUTTER

This standard "Paraform" Heavy-Duty Spiral Milling Cutter, used on the above job, is shown on Page 71 of Barber-Colman Catalog K . . . one of the wide variety of standard "Paraform" Cutters carried in stock for immediate delivery. It will pay you to investigate where standard "Paraform" Cutters can be adapted to your milling operations.

Your milling machines will produce more at lower cutter costs if you use Barber-Colman "Paraform" Cutters like the tractor builder in this case. Here, a standard "Paraform" Heavy-Duty Spiral Cutter slots steel shifter rails, ten at a time. The load cut is $2^{29}/_{32}$" x 1/8" by 3 3/4" long. Floor-to-floor time, 4 1/2 minutes. Production, up to 1000 pieces per sharpening.

Many manufacturers in varied lines are getting similar excellent results because "Paraform" Cutters have distinctive tooth form and uniform high quality. Discover the advantages of standard "Paraform" Cutters by trying them on your work.

Send us a trial order, or if you have a difficult job send the blueprint and receive the recommendations of our experienced Cutter Engineers without obligation.

DATA ON THIS JOB

Name of Part — Shifter rail.

Material — M.D. 1040 steel.

Operation — Mill slot $2^{29}/_{32}$" wide by 1/8" deep by 3 3/4" long through each load of 10 shifter rails, held in a special fixture.

Milling Machine — Kempsmith Maximiller.

Cutter — Barber-Colman "Paraform" Heavy Duty Milling Cutter.

Feed — 2.6" a minute.

Speed — 55 r.p.m.

Production Time — 4 1/2 minutes per load, floor-to-floor.

Pieces per Grind — Up to 1000.

BARBER B-C COLMAN PRODUCTS
HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

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General Offices and Plant 213 Loomis St., Rockford, Illinois, U. S. A.

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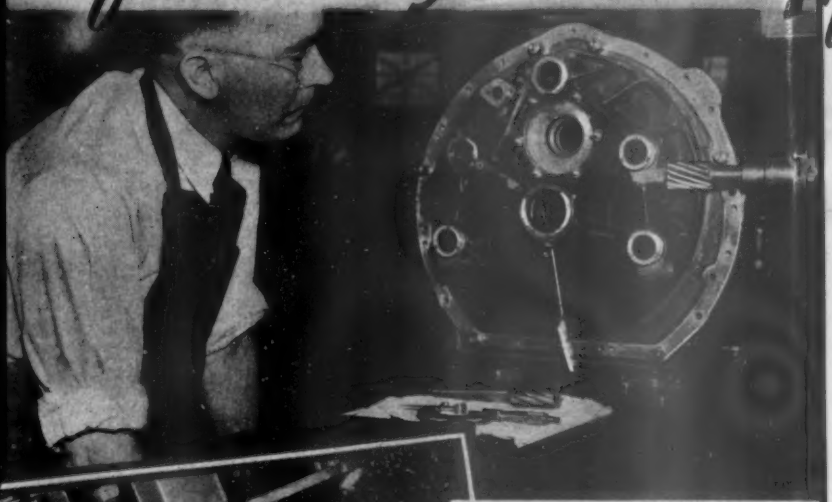

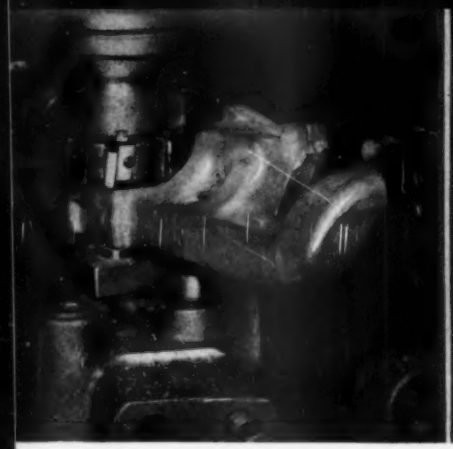

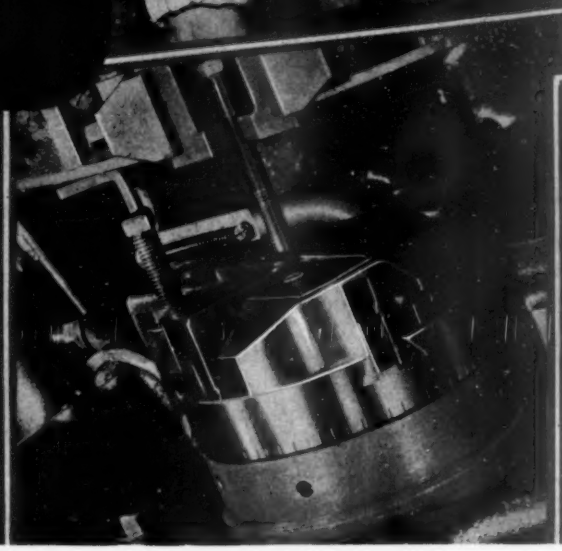

CRUCIBLE STEEL COMPANY of America
CHRYSLER BUILDING, New York, N. Y.

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Please forward me literature on

- ☐ REX HIGH SPEED TOOL BITS
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TE-F41

REX
High Speed
TOOL BITS

One way to test the uniform high quality of REX HIGH SPEED STEELS is to specify "REX" on your next Tool Bit order. Not only are these bits checked throughout manufacture for hardness and subjected to microscopic examination, but every bit is *Magnaflux tested to assure positive soundness.*

On a recent lathe turning test to prov the economy of using REX High Spee Tool Bits, a ½" square bit weighing 5 oz and costing 40 cents removed over 3,000 lbs. of chips!

...ght *REX HIGH SPEED STEELS ...for every machining job

Whether it's 5 pounds of Tool Bits or 50 tons of High Speed Bar Stock . . . Crucible has available . . . from Warehouse or Mill . . . the right High Speed Steel for the job. There need be no guesswork in steel selection when you're served by Crucible!

The uniform high quality of Rex High Speed Steels is maintained constantly. Not only are these grades subjected to rigid metallurgical laboratory inspection but maximum performance is assured through the yardstick of comprehensive cutting tests. The basic lathe test, for example, has been conducted 8 hours a day, 5 days a week, for many years.

During this period of unprecedented production demands, Crucible's vast background of Tool and Specialty Steel experience can prove of great help to your organization. Have you called or written your nearest Crucible Branch-Warehouse to set this service to work in your plant?

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18% tungsten, 4% chromium, 1% vanadium.

REX AAA
18% tungsten, 4% chromium, 1% vanadium, 5% cobalt, .50% molybdenum.

REX 95
14% tungsten, 4% chromium, 2% vanadium, 5% cobalt, .50% molybdenum.

REX SUPERVAN
18% tungsten, 4% chromium, 2% vanadium, .65% molybdenum.

REX CHAMPION
14% tungsten, 4% chromium, 2% vanadium.

REX VM
8% molybdenum, 4% chromium, 2% vanadium.

Information on other grades for special applications available upon request.

REX TMO
8.75% molybdenum, 3.75% chromium, 1.10% vanadium, 1.50% tungsten.

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Help you on your Tooling and Heat Treating!

To help you analyze your machining operations, select and properly "heat treat" the exact steels to improve your production and lower costs . . is the prime "job" of Crucible's practical representatives operating from 26 Branch-Warehouses. Back of these men is a corps of specialists—operating from Crucible's Tool Steel Mills—who are thoroughly familiar with the "Full-Range" of High Speed, Tool and Specialty Steels.

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* REG. U. S. PAT. OFF.

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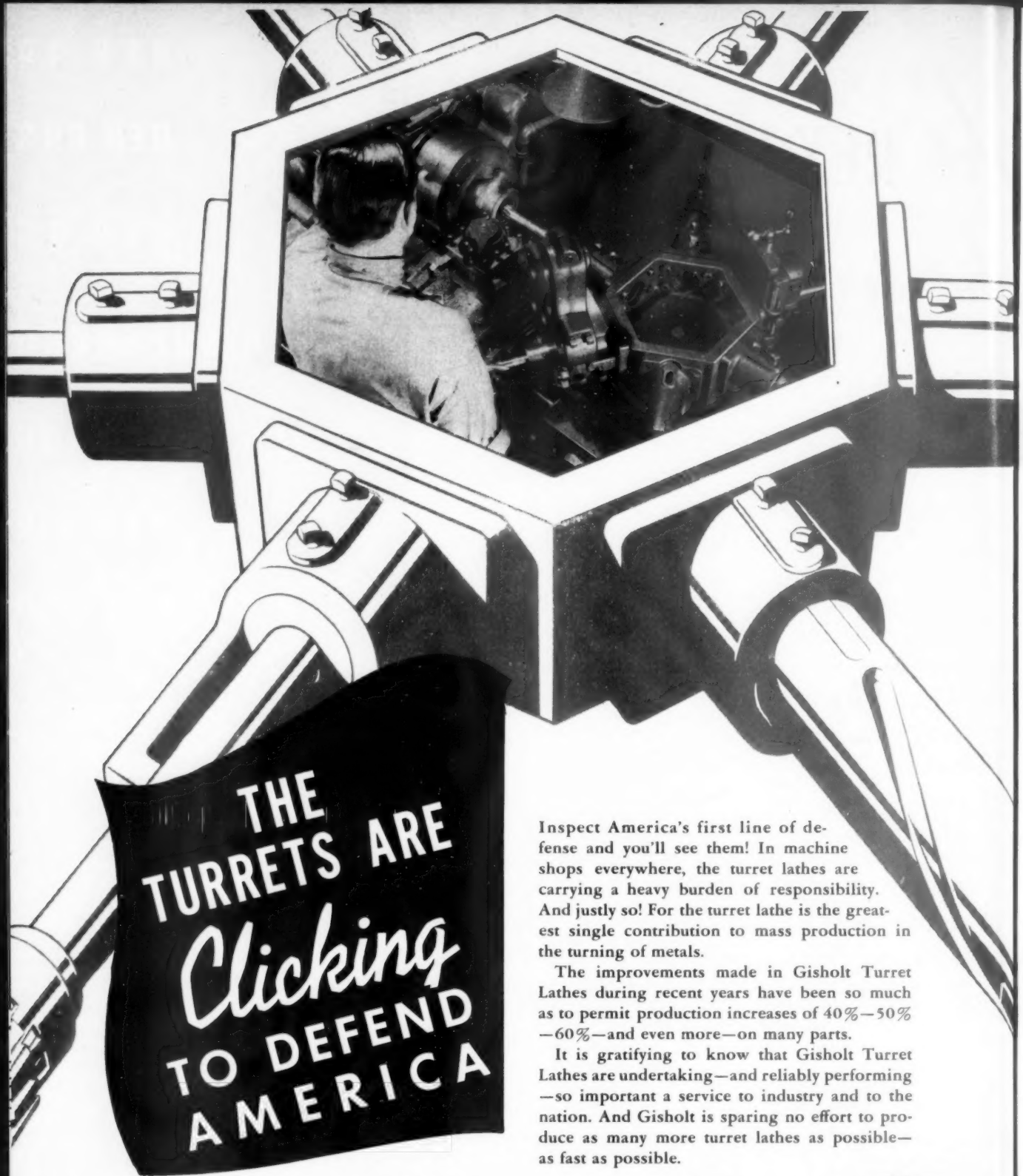


THE TURRETS ARE *Clicking* TO DEFEND AMERICA

Inspect America's first line of defense and you'll see them! In machine shops everywhere, the turret lathes are carrying a heavy burden of responsibility. And justly so! For the turret lathe is the greatest single contribution to mass production in the turning of metals.

The improvements made in Gisholt Turret Lathes during recent years have been so much as to permit production increases of 40%—50%—60%—and even more—on many parts.

It is gratifying to know that Gisholt Turret Lathes are undertaking—and reliably performing—so important a service to industry and to the nation. And Gisholt is sparing no effort to produce as many more turret lathes as possible—as fast as possible.

Look ahead—keep ahead—with Gisholt improvements in metal turning

GISHOLT MACHINE COMPANY

1229 EAST WASHINGTON AVENUE, MADISON, WISCONSIN

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES

ARE YOU CASHING IN ON THESE CARPENTER "Time Savers"

Here's help—timely help—that can boost the output of your plant, substantially reduce production costs, and relieve pressure on the tool room.

Why not use that help now? You will never need it more than you do today—when every tool room is hard put to find enough minutes in the day.

Sure it's aimed at selling Carpenter Tool Steel—but what's that got to do with the hard, down-to-earth factual information it will give you, to solve perhaps the very tool problem that's got you worried right now.

What you need are facts—facts about better tool hardening methods—facts about tool design as it affects the choice of tool steel analyses—facts on machinability of tool steels—facts on the causes and cures of delay-producing tool troubles—facts that are clear, simple, straight-shooting and easy to understand—facts to help you make each tool better and more productive.

If you are one of the thousands upon thousands of tool makers who already have all or some of these time-savers, make sure you are using them to their fullest extent. If you don't have this information on hand—write us today. Except for the textbook, "Tool Steel Simplified," which costs $1.00, all the literature shown will be supplied free to any tool steel user in the U. S. A. A penny post card will bring you your copies.

THE CARPENTER STEEL CO. **122 Bern St., READING, PA.**

Carpenter
MATCHED
TOOL STEELS

FIND an outstanding job of steel cutting ... AND YOU'LL FIND

Vascoloy RAMET

T. M. REG. U. S. PAT. OFF.

TANTALUM-TUNGSTEN CARBIDE TOOLS

DOING THE JOB!

It doesn't make a bit of difference *what* you've been told—the fact remains that more steel is being cut with Tantalum Carbide than with any other carbide tool.

And more is being cut with Vascoloy-Ramet Tantalum-Tungsten Carbide Tools than with any other brand of Tantalum Carbide.

In many key defense industries the majority of the carbide tools being used for steel cutting are Vascoloy-Ramet Tantalum-Tungsten Carbide Tools.

The reason for this? Just one simple fact.

The Vascoloy-Ramet Corporation is an affiliate of Fansteel Metallurgical Corporation and Fansteel is the sole American producer of pure Tantalum; one of the largest producers of pure Tungsten; the possessor of the largest corps of metallurgical scientists specializing in rare metals of any company in the cutting tool industry.

Here, therefore, is no skimping of a gram or two of a rare metal to lower a price.

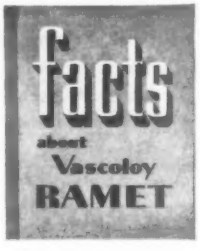
Here, an expertness in blending costly elements to produce combinations that will assure superlative performance.

Here, ample tool grades for roughing or finishing cuts on all materials. There are not one or two, but six Vascoloy-Ramet grades for cutting steel alone, plus other grades of the right strength and hardness for cutting any metallic or non-metallic material.

Here, a combination of Fansteel scientists, saturated with the complexities involved in making the best carbide tools: the standing and reputation of the Vanadium-Alloys Steel Company, the skilled sales engineering ability of the Vascoloy-Ramet organization and the broad experience of leading tool manufacturers.

These manufacturers, who are Vascoloy-Ramet agents, know how to apply Vascoloy-Ramet Tantalum-Tungsten Carbide Tools to tough steel and other metal cutting problems. You will find their recommendations invaluable and they can assure you early delivery.

The manual illustrated here will give you the background of Vascoloy-Ramet tools and blanks and will tell you how they provide the metal working industry with the best carbide tools obtainable.



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North Chicago, Illinois
an affiliate of
VANADIUM-ALLOYS STEEL COMPANY
Pittsburgh, Pennsylvania
and
FANSTEEL METALLURGICAL CORPORATION
North Chicago, Illinois

Factory-Owned Branches: Jersey City, Detroit, Cleveland, Pittsburgh, Cincinnati, Hartford, Providence, Philadelphia.

Authorized Agents in Principal Cities

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"PEACE *hath her victories no less renowned than war"*

LET JONES & LAMSON EQUIP YOU TO WIN BOTH

AUTOMATIC THREAD GRINDERS

PROFIT PRODUCING MACHINE TOOLS

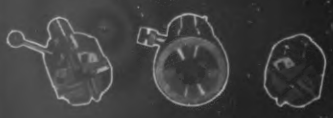
SPECIAL machinery built to manufacture defense orders can serve but one purpose. With the resumption of normal business it can only be scrapped or written off. On the other hand, Jones & Lamson standard equipment can handle a high proportion of your defense work to maximum advantage — *and still be available to earn peace-time profits in the years ahead.* That's why it pays to be familiar with all the possibilities of Jones & Lamson Fay Automatic Lathes, Universal Turret Lathes, Comparators, Automatic Thread Grinding Machines and Automatic Opening Die Heads. Before building or installing any machinery, put your production problems up to Jones & Lamson engineers.

RAM & SADDLE TYPE UNIVERSAL TURRET LATHES

FAY AUTOMATIC LATHES

OPTICAL COMPARATORS

AUTOMATIC OPENING DIE HEADS



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MACHINE COMPANY
Springfield, Vermont, U. S. A.

Manufacturers of Saddle & Ram Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Double-End Milling & Centering Machines . . . Automatic Thread Grinding Machines . . . Comparators . . . Tangent and Radial, Stationary and Revolving Dies and Chasers

The Norton No. 2 Cutter and Tool Grinder

A UNIVERSAL, wheel slide type cutter grinder with multiple controls affording operation from the front or either side. It has an anti-friction bearing wheel spindle capable of mounting a grinding wheel on both ends. The wheel head can be set at any horizontal angle and the table rolls on balls which run between hardened steel ways. Cylindrical, internal and surface grinding operations are performed with the greatest ease, while many attachments can be supplied for such operations as the grinding of gear cutters, hobs, circular form tools, long reamers and so forth.

Send for new booklet, Form 1722A, illustrating some of the many interesting applications of this new cutter grinder.

NORTON COMPANY
WORCESTER, MASS.
New York Chicago Detroit
Cleveland Hartford

M-428

HIGH SPEEDS

mean Smooth, Accurate Work!

The Milwaukee Midgetmill Provides the Necessary High Speeds for Your Small End Mills

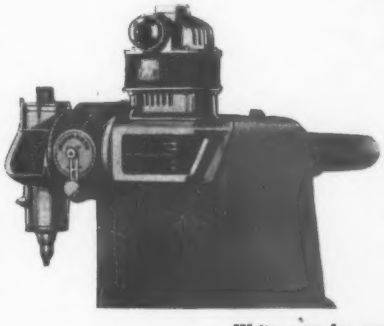
Specially designed to get the most from end mills and milling machines by providing the correct high speeds that mean smooth, clean, accurate work and long tool life — the Milwaukee Midgetmill mills, drills and bores with the utmost rigidity.

Completely universal — adaptable to any milling machine — fast, safe and easy to set up. Innumerable applications to work on dies, fixtures, metal patterns, templates, etc.

Get full information, send for bulletin — No. 662-A.

KEARNEY & TRECKER CORPORATION
MILWAUKEE WISCONSIN

The "THOU-METER"
— exclusive with the Milwaukee Midgetmill. Set cutting tools by direct reading — set dial at zero, and mill, drill or bore until dial shows correct reading — in thousandths. No graduations—no dials—no stops—no binding screws. Accurate to plus or minus .00025 in. in its 2½ in. of travel.



The MILWAUKEE SPEEDMILL
— for end mill speeds up to 5300 r.p.m. Accurate, easy to operate, improved finishes. Adapted to all types of milling machines.

Write now for complete information on the MILWAUKEE MIDGETMILL and SPEEDMILL — built to the same quality standards as Milwaukee Milling Machines.

Products of

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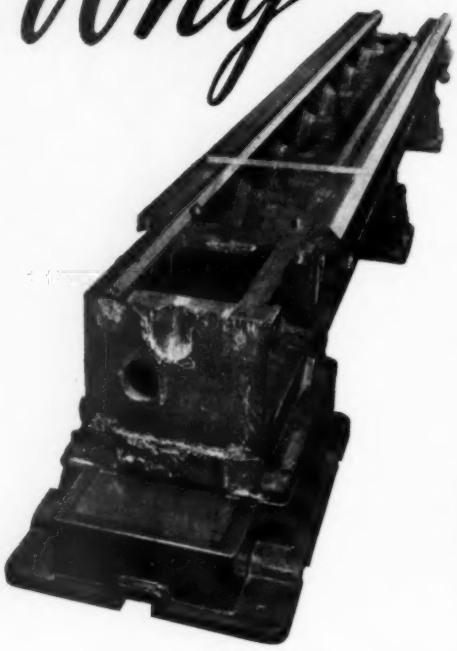
MILWAUKEE MILLING MACHINES

Why AXELSON LATHES SAFEGUARD SCHEDULES

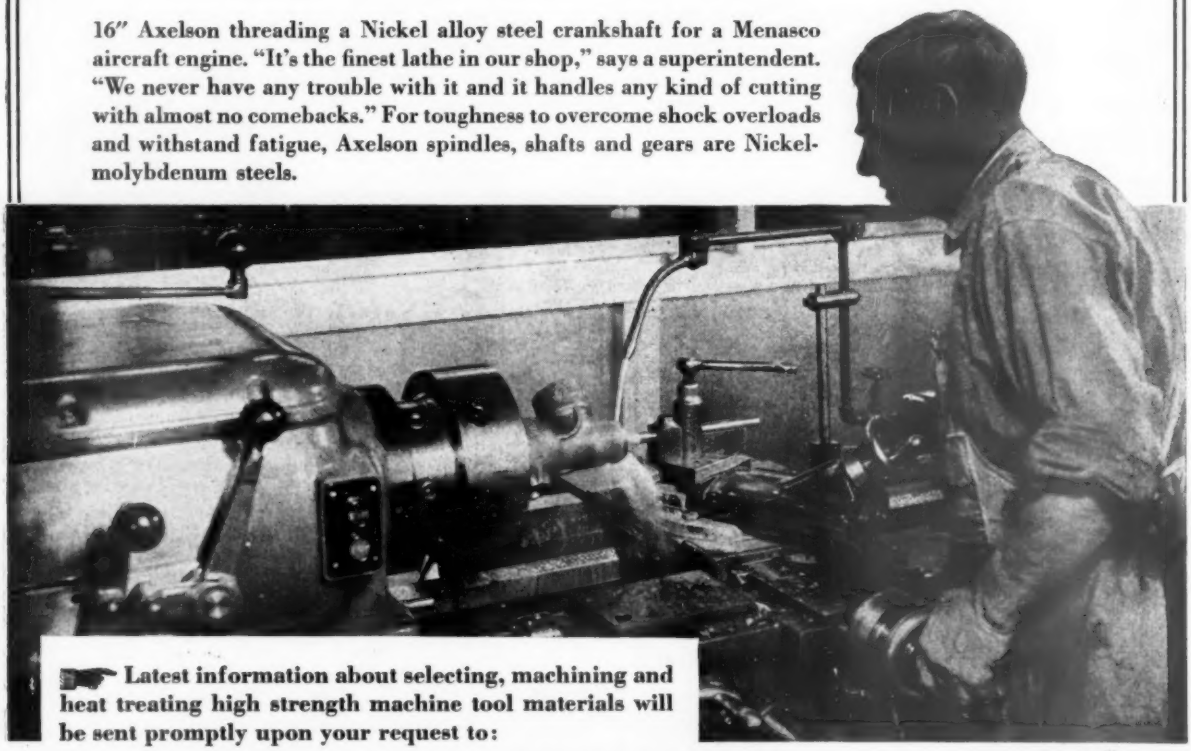


Confronted by a "terrible urgency", makers of machine tools are rapidly turning out improved equipment that can meet speeded-up production schedules. This 24-speed AXELSON lathe pictured below, for example, handles heavy rough cuts or precision finishing quickly and accurately. To maintain accuracy in high speed production, Axelson casts the lathe bed in a wear-resisting Nickel-chromium-molybdenum iron. Tensile strength above 50,000 psi and high elastic modulus—characteristic of Nickel alloyed cast irons—assure perfect alignment through years of hard usage. For strength where the stress comes, AXELSON MFG. CO., Los Angeles, uses a rigid foundation of Nickel alloyed cast iron.

NICKEL

CAST IRONS ★ ALLOY STEELS

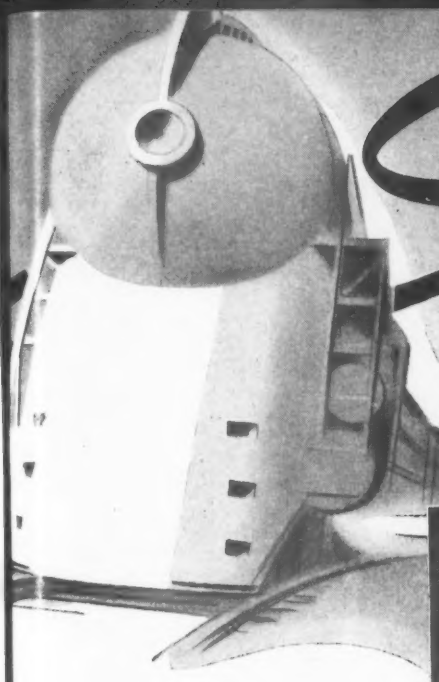
16" Axelson threading a Nickel alloy steel crankshaft for a Menasco aircraft engine. "It's the finest lathe in our shop," says a superintendent. "We never have any trouble with it and it handles any kind of cutting with almost no comebacks." For toughness to overcome shock overloads and withstand fatigue, Axelson spindles, shafts and gears are Nickel-molybdenum steels.



Latest information about selecting, machining and heat treating high strength machine tool materials will be sent promptly upon your request to:

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET
NEW YORK, N. Y.

Streamline YOUR SHOP EQUIPMENT



HUNDREDS of nationally known manufacturers have selected South Bend Lathes when streamlining their shop equipment to meet present day needs. Ease of operation, speed, power, accuracy and efficiency are some of the features responsible for their selection. Substantial savings in capital investment, power consumption, floor space and labor costs have resulted from their installation.

14½" SWING x 6' UNDERNEATH MOTOR DRIVEN SOUTH BEND LATHE

Phantom view of direct drive

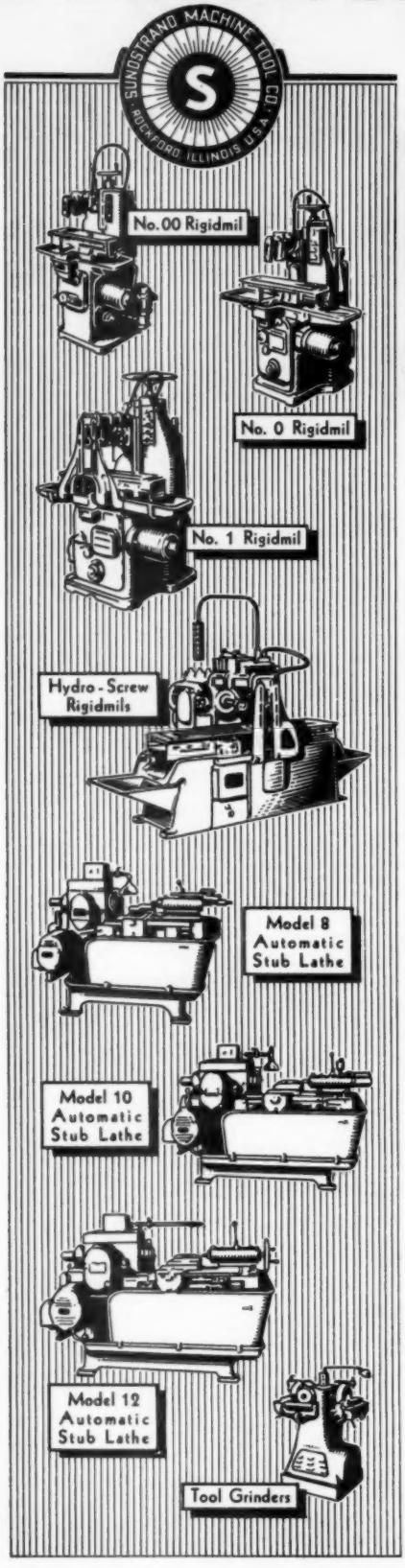
The South Bend Underneath Belt Motor Drive provides an unusually wide range of spindle speeds. The direct belt drive to the spindle assures smooth operation, free from vibration, even at high speed. When slow speeds are required for machining large diameters, a wrenchless bull gear lock permits engaging the back-gears quickly. This fully enclosed drive is compact, silent in operation, trim in appearance, powerful and economical.

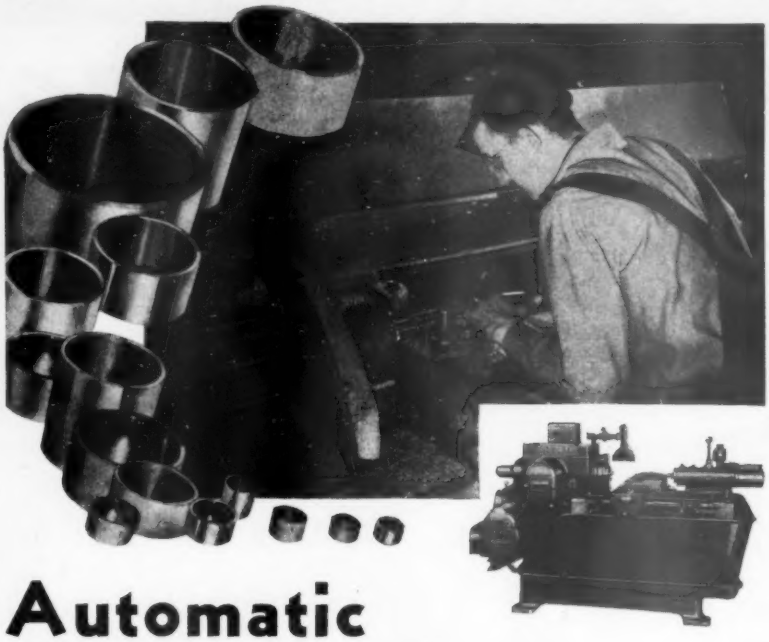
SOUTH BEND LATHE WORKS

Lathe Builders Since 1906

929 East Madison Street — South Bend, Indiana, U. S. A.

Sundstrand *Works* For Peace





Automatic Stub Lathe Turns 1000 Different Bushings

The Automatic Stub Lathe illustrated turns, faces, and bores 1000 different sizes and types of bushings. Easy to set up and change over, it improved production wonderfully immediately after installation.

Other Automatic Stub Lathes are equally successful on thousands of different work-pieces handled in small, medium, or large lots on a high-production basis.

The features and advantages of Automatic Stub Lathes . . . and other Sundstrand machine tools . . . that produce profits in commercial service, also work for peace by increasing output, saving labor, and speeding completion of defense equipment.

Our organization is working at top speed, plant capacity scheduled in advance. Nevertheless, our Engineered Production Department is always available for developing applications of Sundstrand machine tools to commercial service or defense equipment manufacture.

Booklet shown above tells why Sundstrand Automatic Stub Lathes are so easily set up, so highly productive, durable, and economical. Pictures, diagrams and specification tables make it easy to read quickly. Get your copy today. Write for Bulletin 391.

Sundstrand Machine Tool Co.
2532 Eleventh Street, Rockford, Illinois, U. S. A.

RIGIDMILS—STUB LATHES

Hydraulic Operating Equipment — Centering Machines — Tool Grinders

Every member of our organization gladly makes this vow:
"I pledge allegiance to the Flag of the United States of America and to the Republic for which it stands, one Nation indivisible, with liberty and justice for all."

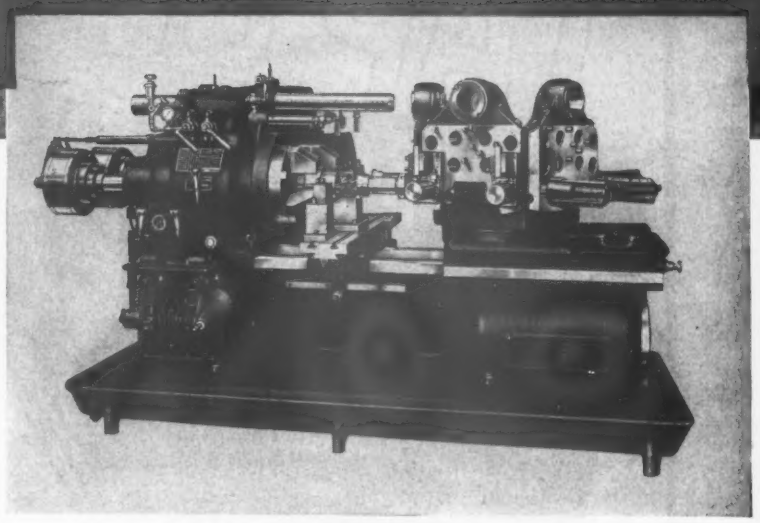
P&J AUTOMATIC CHUCKING MACHINES take on the Tough Jobs in Tank Manufacture . . .

Photo by U. S. Army Signal Corps.

Tough materials, large work, close limits of accuracy—even under these conditions the building of tanks and tank engines demands speed and production efficiency of the highest order. The design of P & J Automatic Chucking Machines and their rugged construction offer literally hundreds of possibilities for the improved production of tank parts.

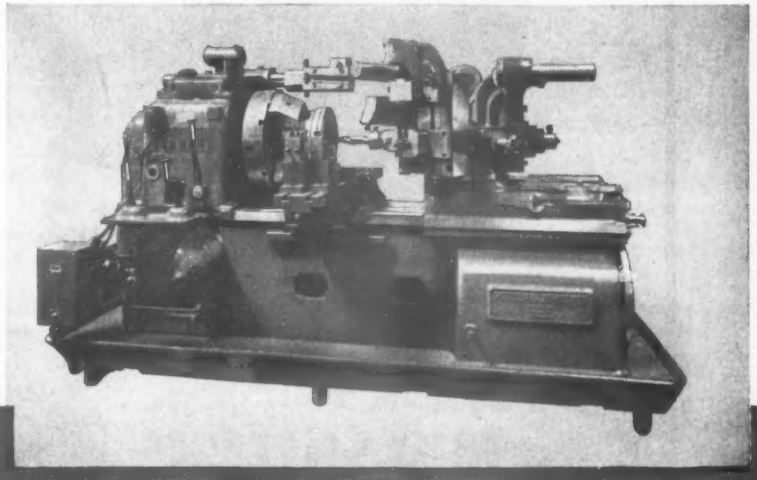
P & J headstock, turret and slide units are of ample dimensions, easily tooled and capable of handling large work with increased efficiency. P & J automatic speed and feed changes permit one operator to handle a battery of machines, resulting in divided labor costs and less operator fatigue. Finally, P & J Engineering Service gives sound advice and suggests improved tooling and methods in every field of manufacture connected with the building of nation's armaments.

New Bulletins give detailed specifications for the entire line of P&J Automatic Chucking and Turning Machines, including the latest 2-spindle 5D-2-9" Machine illustrated above. Write for a complete set of Bulletins, mailed at no obligation to you.



Above: The 5D Power Flex 2-spindle model Automatic Chucking Machine. Unique construction provides an increase in output per square foot of floor space . . . conservation of power . . . moderate initial investment.

Below: P & J Power Flex Automatics are the leading automatics of the single spindle type. Features: Four automatic changes of feed . . . three selective automatic changes of feed . . . makes all automatic changes while under cut.



POTTER & JOHNSTON MACHINE COMPANY, Pawtucket, R. I.

FACTORY REPRESENTATIVES: William L. Martin, Headquarters at Factory; New England States and Eastern New York and New Jersey; A. W. Stone, 165 Kenyon Ave., Plainfield, N. J.; Western New York and New Jersey, Eastern Pennsylvania, Maryland and Delaware; O. Tell DuBois, 8-134 General Motors Building, Detroit, Michigan; Michigan and the City of Toledo, Ohio; Louis K. Voelk, 3865 Woodridge Road, Cleveland, Ohio; Ohio—with the exception of Toledo, and Western Pennsylvania; Harry L. Schuster, 765 W. Fourth St., Milwaukee, Wisconsin; Illinois, Missouri, Wisconsin, Iowa and Indiana. AGENCIES: Millar Machinery Company, 1741 First St., Santa, Seattle, Washington; Hennessy Machinery Co., 2201 Santa Fe Ave., Los Angeles, Calif.; Joshua Hendy Co., 50th and Tennessee Sts., San Francisco; Wonnacott, Helms & Co., Inc., 320 Franklin Ave., Houston, Texas; Arthur Jackson Machine Tool Co., 60 Front St. West, Toronto 1, Ontario; Arthur Jackson Machine Tool Co., 437 Greenmount Ave., Montreal, Canada; Burton Griffiths & Co., Ltd., Birmingham, England; E. & Stokvis et Fils, Paris, France; Rotterdam, Holland and Brussels, Belgium; Maskinaktiebolaget Karlebo, Stockholm 1, Sweden; Ing. Ercole Yaghi, Milano, Italy; Yamatake & Co., Ltd., Tokyo, Japan (Imperial Export Co., 45 Whitehall St., New York, N. Y.); Almanna, Zurich, Switzerland.

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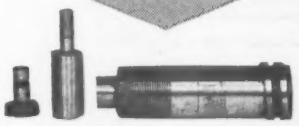

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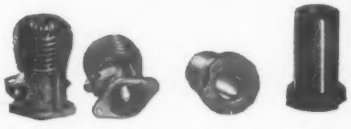
"Produced an extremely accurate and glass-like finish."



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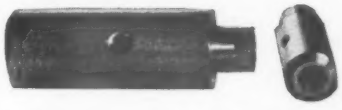
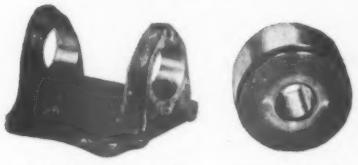


Diesel Engine Fuel Injector Cylinder "So accurate that a piston can be fit within .00005 in."



"Strict alignment maintained between two holes."

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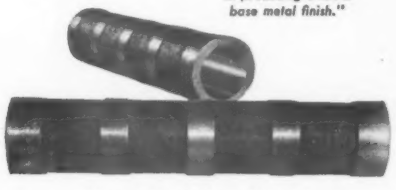
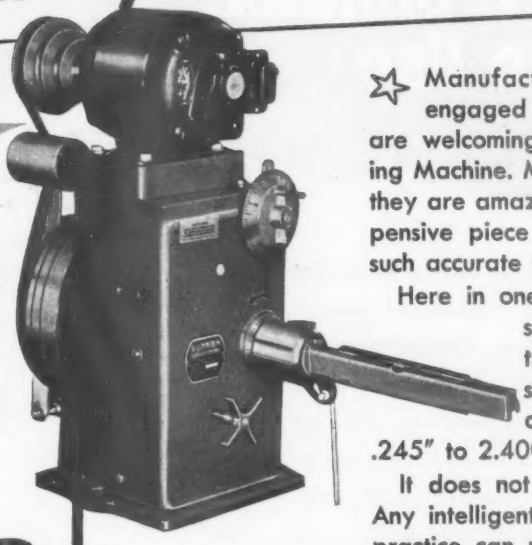


"A perfectly straight round hole with a mirror finish."



☆ Manufacturers — particularly those engaged in the defense program — are welcoming the Sunnen Precision Honing Machine. Many of them have said that they are amazed to find that such an inexpensive piece of equipment can produce such accurate work.

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Hundreds of manufacturers of such parts as gauges, drill jig bushings, bearing races, automatic machinery, hydraulic cylinders, gears, valves, gyroscopes, instruments, pump parts, etc., are using this Precision Hone to their advantage.

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Rubber Eraser Extrusion Die "Tripled life of extrusion dies."

Inner Bearing Ring "Accurately removes last 'tenth' of stock."

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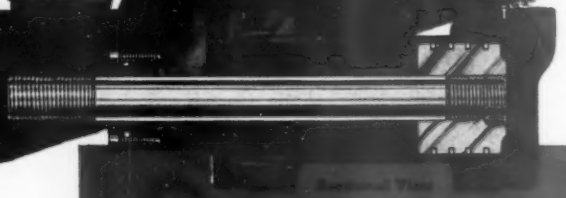
Write for FREE Bulletin

This new 8-page bulletin will give you complete information — or if you prefer a Sales Engineer will be glad to call with his demonstrator and demonstrate what this machine will do for you.

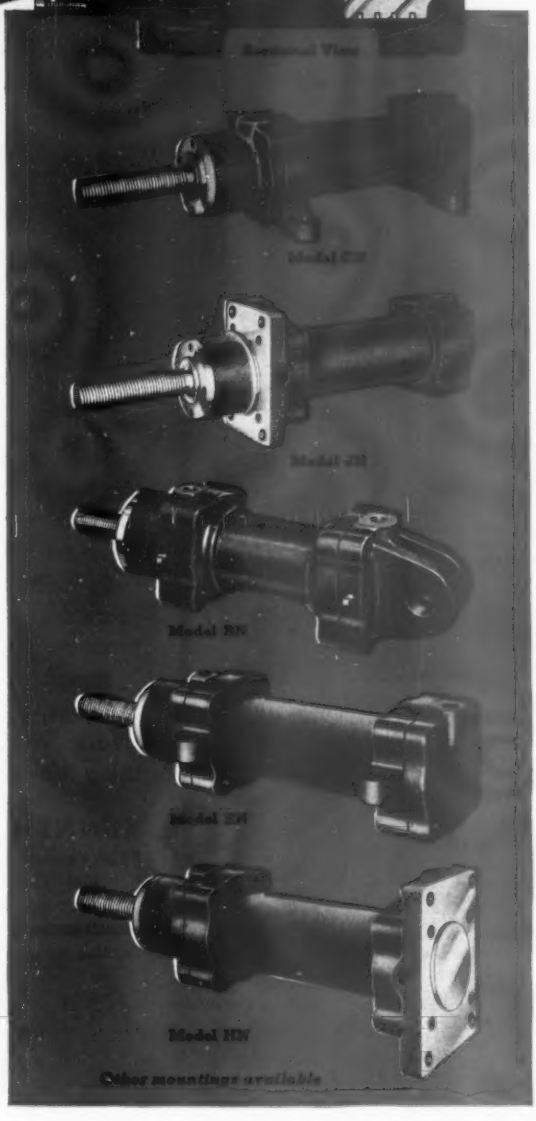
Precision Cylinders

Stronger, Simpler, Easier to Use



Better use of hydraulic power is available with Hannifin patented no-tie-rod design hydraulic cylinders. This design gives a stronger cylinder assembly, simpler to use, assuring high efficiency operation. Special mirror finish honing produces a cylinder bore that is straight, round, perfectly smooth—assuring high efficiency piston seal with minimum fluid slip. No-tie-rod design allows end caps to be positioned independently to bring inlet port at top, bottom, or either side. End caps may be removed without collapse of other parts or disturbing the cylinder mounting. Air vent plugs on three sides of each cap allow for a vent at the top when inlet port is at either side or bottom.

Seven standard mountings simplify applications. These cylinders are available in a full range of sizes, for any length stroke, with small diameter piston rod, 2 to 1 differential piston rod, or double end piston rod. Write for Bulletin 35 with complete specifications.



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HANNIFIN HYDRAULIC CYLINDERS

When Reason Is Gone

IF YOU would like to spend an amusing half hour sometime, get out the records of your local city ordinances and read over those passed more than ten years ago. Many of them will now seem ridiculous and you can enjoy a quiet laugh at the consternation which would be caused were they to be enforced today.

There was a reason back of every one of those ordinances when they were passed, and in most cases it was a good reason. But as the years went by conditions changed and the reason disappeared. Unaffected by changing conditions, the law remained on the books, theoretically as powerful as ever. Since it is much more difficult to repeal a law than it is to pass it originally, enforcement relaxed and ordinances were just forgotten.

This same situation will be found to prevail in some state and national legislation with one fundamental difference: As you progress up the scale the legislation becomes more important and hence the hidden power of forgotten laws becomes more potent.

In the dark days when Franklin Roosevelt first took office he did not feel that there was time to seek from Congress the powers he wanted to use in dealing with the crisis. He checked back thru the years until he found on the books unrepealed, but forgotten, laws giving him the powers he needed. It was then only necessary to invoke these laws in order to have the powers desired.

As Bill Number 1776 (the Lend-Lease Bill to Aid Britain) nears passage it is important for us to remember these facts. It is important for us to realize what tremendous power this Bill, and others Congress will doubtless enact before this war is over, confers upon the President.

There is little chance of ever repealing such acts. Let us rather safeguard our democracy through insertion of a time limit in every such bill which is passed. Let us have the foresight to see that the powers do not remain after the reason for granting them is gone. Only in this way can we protect America from the possibilities of a dictatorship which might result should we, in some future election, place in office an unscrupulous man who invoked the powers for personal rather than national gain.

PRODUCTION: *Up 50%*

A certain New Jersey manufacturer reports this very good saving in tapping costs. This screw machine is turning out a part made of 3½% nickel steel. Tapping a ⅜-24 hole was the "bottleneck" of the job until they switched to "G. T. D. Greenfield" Taps. The solution recommended was a roughing cut with a *"Gun"* Tap and the last .010 of an inch removed by a ⅜-24 High Speed Steel Ground Thread "G. T. D. Greenfield" Tap. Production on the whole job jumped 50%.

To manufacturers everywhere who must use every possible means of increasing production, we say—"Have you thoroughly investigated 'G. T. D. Greenfield' Taps? —Ground Thread High Speed Steel for fast, accurate work; *'Gun'* Taps for 'through holes'; *'Maxi'* (the special surface treatment) for stringy or abrasive materials." "G. T. D. Greenfield" Engineers will arrange a test at your convenience.

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Better Methods Start with the Tool Engineer

By GUY J. BATES
Supervisor of Methods, Inland Manufacturing Division
General Motors Corp., Dayton, Ohio

IN the past the Tool Engineer has had a poor opinion of "motion study" as a practical tool to be used for everyday design problems. His attitude has not been without foundation. Micromotion study with its therebligs, simo-charts, and other specialized analysis procedures has required the interpretation of a skilled analyst. Recent developments in the field of methods study, however, have brought into use a new technique of operation analysis that can be profitably used by the Tool Engineer in his daily work.

To better understand the nature of this new technique let us draw an analogy with an example common to all our experience. Suppose we have before us a part and a blue print. We are asked to check the physical dimensions of the part against the print. The first tool we would request would be a measuring device. In the case of the part, it would be a scale and a pair of micrometers. The new technique of operation analysis is a similar device, a measuring stick, by which the effectiveness of an operation in the shop may be judged with reference to its use of labor.

When the methods engineer approaches an operation in the shop for the purpose of measuring the effectiveness of the labor utilization, he uses the new technique of operation analysis and observes the muscular movements of the operator. Through his observations of the muscular movements required by the worker to perform the cycle of the operation, he is able to judge the effectiveness of the workplace layout, the tooling, and the training of the operator.

The methods engineer has made considerable progress in improving existing operations in the plant. Intensive training programs have been instituted to train plant supervisors in this technique of operation analysis. The results have been most gratifying. The combined efforts of the plant supervisor and the methods engineer have materially reduced waste effort in the plant.

Unfortunately, this approach to better methods is basically wrong. It contains too much of the element of "locking the barn after the horse is stolen." The solu-

It is putting the cart before the horse, thinks Guy Bates, to worry about motion study after a machine is put in operation. He firmly thinks that it should be done while the machine is being designed. Below are twenty questions he feels every machine and fixture designer should ask:

1. Is the job safe for the operator?
2. Is there sufficient leg room so the operator can operate the equipment while seated?
3. Is the work level slightly below elbow level when the operator is standing?
4. Does the design permit loading of the fixture without "change control"?
5. Does the design permit unloading of the fixture without "change control"?
6. Is the work equally distributed between both hands?
7. Can a mechanical ejector be used to remove the piece from the fixture?
8. Have all barriers been eliminated from the movement path?
9. Can a foot pedal be used to free the hand for other useful work?
10. Have bullet-nose pins, guides, or bellmouths been provided to reduce "lining up" movements?
11. Have mechanical holders been provided to eliminate the operator's hand as a holding device?
12. Are all control levers centralized and within normal work area?
13. Are all levers "quick acting"? (Toggles and cams instead of screw clamps.)
14. Can control levers be designed to serve multiple functions?
15. Has sufficient chip clearance been provided?
16. Can chips be washed or blown off automatically?
17. Has fast feed to, and return from, the cutting point been provided?
18. Has the design provided for simple change over to reduce set-up time?
19. Will the upkeep of the fixture be low?
20. Has the fixture hourly output been adjusted to the "line balance"?

tion of this problem lies within the scope of the Tool Engineer. It is he who controls the design of the original tool before it arrives in the production department. If he supplies a well designed tool we have the most effective labor utilization. On the other hand, if the tool is poorly designed we have two obvious losses. First there is the redesign and rebuilding cost, and second there is the added labor cost of operating poorly designed tooling workplaces until the improved steup can be provided.

This condition is recognized by some of our farsighted Tool Engineers. For example in the TOOL ENGINEER for June 1939, J. R. Weaver in his article, "Why Buy New Machine Tools", writes as follows: "A great deal has been done by the machine tool manufacturer to build his machine more rugged in order to be able to increase speeds and feeds. It seems, however, that he has overlooked a most fertile field. This condition can be improved I believe by a thorough study of loading and unloading methods, proper location of feed and speed changing levers, development of methods of changing feeds and speeds more quickly with less fatigue, and improvement in the method of setting up tools."

Mere recognition of the problem is not enough. The time is rapidly approaching when the Tool Engineer is going to be held accountable for the design of his tooling from a labor utilization standpoint. The tooling must still produce the part to print, but no longer can the tool designer stop there. He must, in the future, consider the movements required of the worker to operate the equipment, and reduce them to a minimum.

Management is beginning to recognize the fallacy of the old approach, of improving the job after it is running in the shop. As the plant supervisor becomes better equipped through methods training, to spot poorly designed setups, greater pressure is going to be brought to bear on the tool designer. In the future movement economy must be *designed* into new equipment.

Tooling should extend man's ability to produce. It is, therefore, only logical that we approach the problem of designing equipment from the standpoint of the conservation of human energy.

Here Are Some Ways to Build Movement Economy Into Tools

1. Replace hand movement by automatic movement.
2. Replace hand movement by foot movement.
3. Eliminate the passing of work from one hand to the other.
4. Provide hand levers, etc., with multiple functions.
5. Provide means for finished work to drop from fixture into discharge chutes.
6. When drop discharge cannot be used, arrange for disposing directly in front of operator, over top of machine is often a good solution.
7. Arrange for getting new work from hopper or chute as close as possible to whenever discharge point so as to overlap movements.
8. Eliminate the use of the hands as a holding device.
9. When possible keep hand movements within radius of forearm from elbow height up and away. In all events keep within radius of full arm without body bent or twist and without necessity for stepping to reach point desired.
10. Eliminate barriers so that movements can follow shortest path.
11. Keep both hands busy with useful work and avoid wait of one hand.
12. Provide double station fixtures.
13. Eliminate hard to find controls such as small buttons which require eye directing.
14. Aid locating by means of slides, guides, flanges, stops, bell mouth, holes and bullet nosed pins.
15. Separate scrap from good parts.
16. Keep eye movements within small space, about six inch circle.
17. Avoid necessity for operator assuming uncomfortable position. Most of work should be at elbow level.
18. Build controls of proper size, shape, and weight and build to operate without undue effort.
19. Build foot pedals so that they may be operated with comfort by either foot.
20. Where feasible, arrange so that machine can be operated equally well from standing or sitting position. This is best accomplished by arranging to work at elbow height when standing, then provide high posture chairs so that operator may sit and still work at elbow height. When foot controls are used, it is generally necessary to provide upper and lower pedals.
21. Provide definite location for loose tools. Mount if possible in position for use to require as little handling as possible.
22. Make all controls "quick acting". Use toggles or cams instead of screw clamps.
23. Design machines for loading so that those tools such as pliers, tongs, etc., do not have to be used to place the parts in fixture.
24. Where possible, levers such as feed handles on single spindle drills should be made reversible so that they can be operated by either the right or left hand.
25. Design machines as much as possible to shed oil dirt by eliminating flat horizontal surfaces.
26. Provide sufficient place for chips and turnings and make these places easily accessible for clean out.
27. Provide sufficient toe space to allow operator to stand up to machine as he should.
28. Provide compound lines large enough to keep chips and turnings washed off fixtures to relieve operator from having to brush or blow off.
29. Provide for easily simple and quick tool changes and set up change.
30. Provide for fast feed of tools or carriages up to work and fast return to unloading point.
31. Make the job safe for the operator. Do not sacrifice safety for motion economy but strive for both.

General recommendations for those still unfamiliar with the widening field of hydraulic appliances.

Bugs

In the Oil Line

By A. E. RYLANDER
Supervisor, Special Equipment Design
Midland Steel Products Co.
Detroit, Michigan

WHILE hydraulic appliances are gaining in favor among Tool Engineers and production executives, users may encounter considerable minor annoyance rather than extreme faults in design or manufacture. While the basic principle of hydraulic action is as old as nature itself, its application to mass production is a comparatively recent innovation. Yet, hydraulic equipment, as pumps, cylinders, valves and so on, is about as good as can be expected at this stage of the game, and if anything, is in a more advanced stage than the automobile, years of development taken into consideration. Besides, improvements are coming along at an accelerating pace, and we may look for continued progress and refinement as demand increases.

The writer would stress, at this point, that comments in this writing, are general, and that criticism and recommendation is advanced with a view toward provoking interest and discussion. The writer's aim is to point out faults in design and installation of the ordinary, low cost, commercial units most commonly used and, by effecting improvements, promote use and demand. Certainly hydraulically operated tools and machines have much to recommend them. They are quiet, positive, and convenient, besides, have the advantage that they take up comparatively little floor space in themselves while pumps can be installed in pits or on mezzanines. While a cylinder or valve may fail occasionally, replacements are fairly cheap and change quickly effected, hence, production schedules are not seriously delayed.

However, there is the fact of occasional failure, (true also of purely mechanical units) when a user may condemn a line which is essentially well designed and carefully manufactured. But, if he changes to another make, he may run into other "bugs" which are as annoying with the result that, on future developments, he may favor the mechanically operated device rather than the hydraulic. One "bug", inherent to a greater or lesser degree in hydraulic cylinders is leakage at the joints. It is my belief that all manufacturers of hydraulic equipment have gone to extreme pains to eliminate leakage, or at least, to reduce it to a practical minimum. To expect absolute nonleakage is unreasonable, since that would imply that piston rods run dry in the packing glands. But, a reasonable absence of leaks should be expected. To effect this, there will be required some study and experimentation between makers of cylinders and manufacturers of packings, as well as the cooperation and consideration of the users. In the final analysis, the user is the greater beneficiary; demand proves the desirability of hydraulic operations are sometimes extended to meet the desires of the buying engineer. Remember, here, that the streamlined automobile did not become fact until we had created the machinery to make it. Let us criticise constructively, but be considerate in our expectations.

Of course, it can be contended that there are cylinders on the market which are practically leak-proof, and the writer concedes this point. Taken as a whole some cylinders are excellent, the most good, but in the writer's experience (and it has been considerable) even the best will fail nor is failure necessarily due to skimping or neglect on the part of the maker. For example, a maker may decide

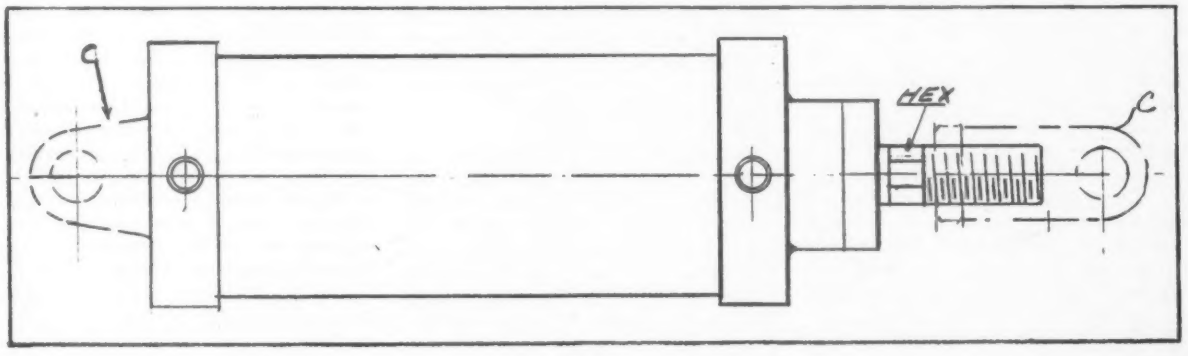


Figure 1

to heat treat an alloy steel cylinder, already adequately strong, to render it even stronger. A hardening crack may develop which, while it may not show up in a test, will open and emit oil after a period of use. In a case of this sort the maker should be commended for good intentions, not criticised for a failure which just happened.

One thing which may be overlooked by the maker is that the application may induce stresses which are in excess of the rated load of the cylinder. For instance, a cylinder rated at 1000 lb. pressure p.s.i., and actually loaded to but half its rating, may be used to actuate a lever which, carrying a heavy weight that may be suddenly arrested, will literally tear loose from clevises or mounting brackets. In this connection the writer suggests that cushions, as now designed and applied, are not adequate; cushions should be augmented with extraneous dashpots and even rubber bumpers. Also, cylinder heads, especially those with integral clevis, (C, in broken lines, Fig. 1) should be made of steel, with steel clevis on the rod. Cast iron will break, if not from overload then from shock.

Thought should also be given to replacement in the field, since repairs cannot always be made by skilled mechanics. It would be well, therefore, if the threaded diameter of piston rod be made smaller than rod proper, to prevent scoring of packings when repacking. Also, it were a good idea to chamfer the gland packing bore, for easy entry of packing. The cap will close the chamfer. (See Fig. 2) The writer would also recommend that a hexagon be milled on the rod, just clear of the packing gland cap and between it and the thread, so as to obviate the use of pipe wrenches when screwing on nut or clevis. A score from a pipe wrench may easily damage the packing and cause a serious leakage; besides, the hex will appeal to the user. It will be more "mechanical". Whenever application permits (and this will be found the rule, not the exception) rods should be threaded on the outside for maximum strength. In the earlier days of hydraulic application, the writer suffered considerable annoyance, not to mention expense to the employer, from screws breaking off in the internally threaded rods. This despite that screws were made of the toughest alloy steel available.

Clevis pins should be fairly large; in the writer's opinion, not less than 1" diameter for a 2" dia. bore cylinder designed for 1000 lb. pressure, proportionately larger as pressure or bore increases. It would be highly desirable that cylinders be standardized, for interchangeability. As it is, competitive makes have different rod diameters, different threads and various lengths, enough difference so that considerable and expensive redesign may be necessary should a user decide to replace a cylinder with one of another make. There is no valid reason why cylinders should not be standardized, while yet leaving each maker free to provide "specials" which may have extra, desirable features. Consider that ball bearings have been standardized for years without materially affecting user preference; if anything, standardization has enhanced the quality of ball bearings generally and has had a very favorable effect on the ball bearing industry as a whole.

As previously intimated, there must be cooperation between the maker and the user if hydraulic applications are to work satisfactorily. The best equipment will fail if improperly applied. There is a temptation, especially when tooling budgets are scaled down, to use equipment on the skimpy rather than the ample side. The larger the cylinder, obviously the lesser the pressure required for operation. On the other hand, tool designers are constantly fighting for dimensions, for the room in which to install appliances; in such cases the smaller cylinder and higher pressure is the logical choice. In applying, however, the stroke of cylinder should be greater than stroke used, so that piston need not travel full length of bore and, as a result, hit the cylinder heads. The recurrent shock may loosen the joints and cause leakage past the gaskets. If one end of a cylinder must be used for a stop, rather than that extraneous, adjustable stops be provided, then stop against the blind head with the shortened stroke toward the rod end.

One factor in leakage is that, with incessant operation, the oil in the system becomes heated, reducing its viscosity. A thin oil will seep past a packing or gasket quicker than a heavier bodied fluid. Various expedients are resorted to to keep down temperatures; one is to install a cooling coil in the pump tank. This, however, means disposal of water and entails provisions for drains. Yet, a 30 gallon range boiler, disposed vertically beside the pump and with the return coming in at the top, will not only provide radiating surface but, due to larger volume, reduce heat. As previously suggested, pumps may be disposed on mezzanines or in pits; in the first case, shutoff cocks should be provided so as to eliminate need to drain system should a cylinder or valve have to be removed. Naturally, drain cocks should also be provided. When placed in pits, the breather cap should be replaced with a gasketed cover and a standpipe, higher than highest appliance used, should be installed.

It may be desirable, at times, to operate various banks of cylinders from one pump, on intermittent cycles. It will be found that when one group of cylinders is under pressure, and another group suddenly applied, that there is a momentary drop in pressure in the first bank until the pressure equalizes. To maintain pressure, it is only necessary to install check valves between the operating valves and the group line or manifold, naturally seeing that there is no stricture on the return or exhaust lines. In this connection, it is advisable to use the lately developed hydraulic tubing and fittings in preference to commercial heavy pipe. It costs more but is worth the difference, is actually cheaper in the long run. Hose, too, has been refined until it is extremely strong and durable; preferably, connections should be put on by the manufacturer, the correct lengths specified by the buyer. These are general recommendations, for consideration of the manufacturers of hydraulic equipment as well as for designers who have but slightly broached the use of hydraulic devices. In a widening field, however, application will gain in favor.

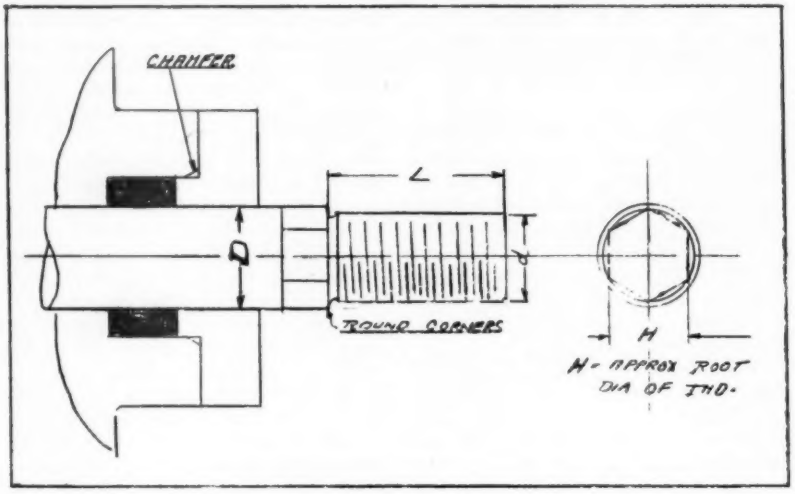


Figure 2

Show Officials Are Practical Production Men

Executives and engineers of companies now tooling up for defense are officials preparing for the forthcoming National Machine & Tool Progress Exhibition and convention of the American Society of Tool Engineers, sponsors of the exhibition. The chairman of the exhibit committee which is responsible for approving all exhibits, especially from the stand-

Chairman Smila
Approves the exhibits.

point of their interest and value to national defense production, is Frank Shuler, general master mechanic of the Chrysler Corporation, Highland Park plant. Cooperating with him on this committee are Frank Crone, chief tool designer of the Lincoln Motor Car division of the Ford Motor Company, William A. Smila, master mechanic of the Chrysler Division of Chrysler Corporation, and Luke E. Beach, master mechanic, Detroit Transmission Division of General Motors. Mr. Crone is also national treasurer of the Society.

Responsible for the program for the Tool Engineers convention, to be held concurrently with the exhibition, are James R. Weaver of the Westinghouse Electric and Manufacturing Company, Walter Wagner of Lincoln Motor Car Division and Homer Bayliss of the Motch & Merryweather Machinery Company. Clyde Hause of the Gorham Tool Company is in charge of plant inspection trips and transportation.

Ford R. Lamb, Executive Secretary of the A. S. T. E., is general manager of the Exhibition, which will open to the public on Tuesday, March 25, and run through Saturday afternoon.

Machine and Tool Progress Exhibition May Increase Defense Production by 12 Per Cent

As plans for the 1941 Machine and Tool Progress Exhibition, to be held in Detroit's Convention Hall the week of March 25, neared completion, it was estimated by men familiar with industrial equipment that the educational value of this show and the technical sessions associated with it may possibly increase the productive capacity of industrial equipment as much as 12 per cent.

At the present time it is estimated that heavy equipment used in the defense production program are actually removing metal at only about ten per cent of their capacity. The use of better planning and of prearranged templates and set-up fixtures can increase the operating time on these machines by as much as one hundred per cent. The better knowledge of the latest developments in tools and their applications to the defense program which those in attendance at the show will acquire, will enable them to more efficiently plan and tool the defense jobs which they meet in future months.

It is estimated that registration will run around 30,000 for this year's Machine & Tool Progress Exhibition. Experience has shown that each registrant, on the average, attends the Show three times in order that he may more thoroughly take in the exhibits and technical sessions. The door admissions for the Show will therefore probably exceed 80,000.

Chairman Weaver
Secures the speakers.

Wesson, Davies Among Speakers At March Meeting

General C. M. Wesson, Chief of Ordnance, U. S. Army, will be the speaker for the Preview dinner on Monday night, March 24. Toastmaster for the occasion will be L. Clayton Hill, Murray Body Corporation. An invited group of production executives will visit the exhibits of the American Society of Tool Engineer's Show, which opens the next day, and will hear General Wesson speak on the subject "What is Needed for National Defense."

Technical Sessions of the Annual Meeting of the A.S.T.E., which will be held concurrently with the Show, will concern themselves with National Defense. The first symposium, on Tuesday night, will be devoted to aircraft. Walter Wagner, Master Mechanic, Lincoln Motor Company, will preside. Papers will be presented upon "Tooling for Aircraft Fuselage Production" and "Tooling for Aircraft Engine Production." Discussion of the papers will be led by C. C. Carlson.

Naval problems will be treated at the Wednesday night symposium. Chairman will be Homer C. Bayliss. Joseph A. Davies, Chief Planner and Estimator, Naval Gun Factory, will speak upon "Planning for Production of Naval Ordnance Units." Other speakers will be announced later.

"Education for National Defense" will be the subject for the Thursday Night session, at which H. D. Hall will preside. P. W. Brown, Assistant Works Manager, Wright Aeronautical Corporation, will speak on "Industry's Need in Skilled Help." Because of the difficulty which Wright has had in manning their large plant expansions recently, Mr. Brown will be in an excellent position to cover this situation. Carl A. Gray, Chairman of the Governor's Committee in Industrial Training for the State of Connecticut, will explain "How Connecticut Solved Industry's Training Problem." The work of Mr. Gray's Committee has been instrumental in giving his state a leading place in industrial training. James R. Weaver will discuss the A.S.T.E. educational program and will lead a discussion of the other papers.

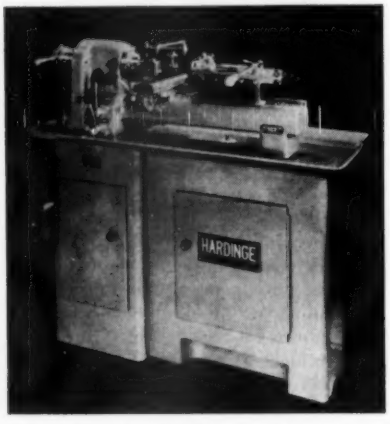
IT'S NEW

NEW EQUIPMENT—NEW MATERIALS—NEW PROCESSES

Hardinge
Second Operation Machine (E1)

A new High Speed Precision Second Operation Machine is offered by Hardinge Brothers, Inc., Elmira, N. Y. This machine is said to be a complete refinement of all their similar, previous machines. Secondary operations, in many cases, are the final finishing or exact sizing operations performed on a partially completed part.

This machine includes an enclosed head with preloaded ball bearing spindle construction, electrical driving unit with multi-speed motor, eliminating all gears, clutches, and loose pulleys, convenient lever speed control at the headstock of the machine, and welded, all steel pedestal.



Second Operation Machine
Previous machines were refined.

The pedestal encloses completely the motor and driving unit to afford greatest safety for the operator and also to protect the driving unit from foreign matter. The motor belt is adjusted from one step to another by opening a door in the pedestal. Another door opens into cabinet storage space for attachments.

LeBlond
Gun Rifling Machine (E2)

A new No. 2 Gun Rifling Machine of the R. K. LeBlond Machine Tool Co., Cincinnati, is built for rifling guns up to three inch bore, 88 inches in length. Indexing the gun or indexing the bar is said to be quite simple with this machine. The grooves may be either cut or broached. Adjustable Automatic Stops control the movement of the carriage. At the end of each stroke it stops. It is possible to get any travel up to the maximum of ten feet.

Conveniently located on the control rod are two manually operated levers. The control rod runs the full length of the bed, and operates a four-way valve to start, stop, and reverse the direction of travel on the carriage. In the head-end leg are two adjustable hydraulic speed control valves—one to change the speed of the carriage on the forward stroke, while the other performs a similar duty on the return stroke.

Jones & Lamson
Vertical Optical Comparator (E3)

A new Vertical Optical Comparator has been added to the line of the Jones and Lamson Machine Company, Springfield, Vt. The machine is said to be suitable for laboratory or shop use. Set in the object staging table is a 3¼ inch diameter glass disc on which objects may be staged for projection. To focus the object, the table is adjusted vertically by a screw at the top of the machine.

An eight inch ground and lapped mirror, coated with aluminum oxide, reflects the object shadow on to a 14 inch receiving screen. The machine is designed for checking small, flat objects which can be laid directly on the glass stage. The enlarged shadow of the contour can be compared with outline on the screen. Projection lenses are available to provide magnifications ranging from six to 100 diameters.

Vertical Optical Comparator
Rugged for the shop, accurate for the laboratory.

(Continued on following page)

PLEASE NOTE: The purpose of this department is to call to the attention of its readers new production ideas. To aid readers in getting complete technical data on any item in which they are interested a key number is given for use on the post card bound in this issue.

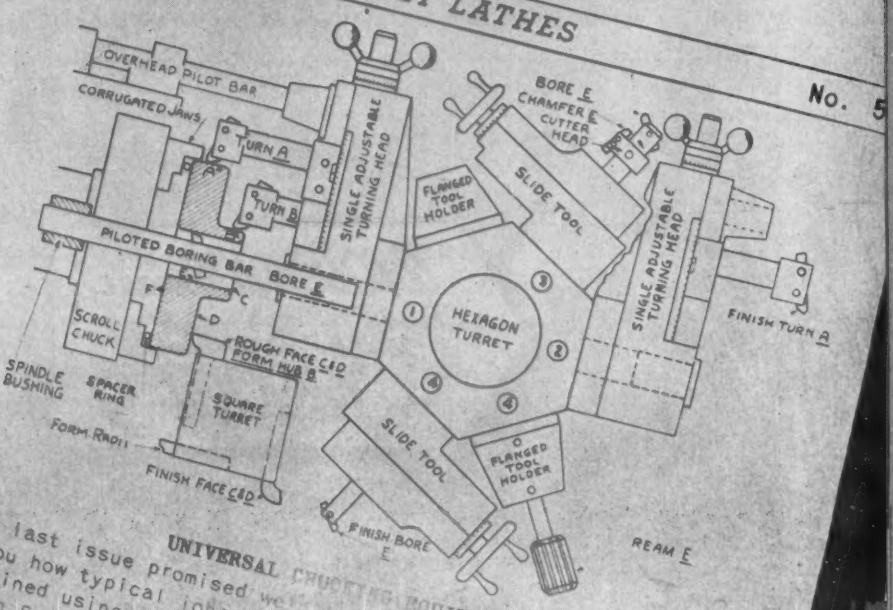
Gun Rifling Machine
The controls are as convenient as a trigger.

BLUE CHIPS from Warner & Swasey

FOR MEN WHO KNOW TURRET LATHES

TURRET LATHE OPERATOR'S MANUAL

To Help You Get Better Results Easier



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The last issue promised we
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work arbors

We're Betting on Your Operators with "BLUE CHIPS"

"Blue Chips" is a bulletin sent regularly by the Service Bureau of Warner & Swasey, directly to turret lathe operators. Written in "shop language," these bulletins are full of practical ideas and suggestions to help men become better operators of turret lathes. Valuable contributions are sent in by operators all over the country. These men are finding better ways of turning metal, and want to pass along their experience. So we publish these ideas in "Blue Chips."

Today, when top production is urgent—skilled men scarce—and deliveries of new turret lathes delayed, the training of operators assumes greater importance than ever before.

Send for sample copies of "Blue Chips." Look them over and if you wish your operators to receive these bulletins regularly without cost to them or to you, send us their names and home addresses. Write

WARNER & SWASEY
Operator Service Bureau 406, Cleveland, Ohio

Gentlemen: We are interested in your offer to send "Blue Chips" to our turret lathe operators without charge and would like to see sample copies.

Name

Company

Address

WARNER & SWASEY
Turret Lathes
Cleveland

YOU CAN TURN IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY

Schauer
High Production Speed Lathe (E4)

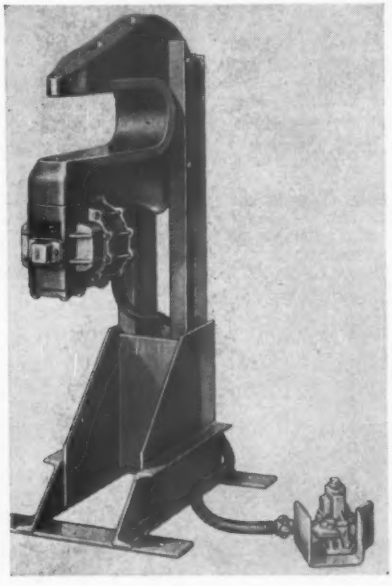
A new high production speed lathe is offered by the Schauer Machine Company, Cincinnati, Ohio. Featuring continuous motor operation, this machine is intended for light finishing operations—such as burnishing, lapping, burring, or polishing of small parts—to avoid diverting heavy machinery for such operations.

Collet and spindle are magnetically controlled and are engaged or disengaged by foot-treadle operation. Special, built-in features are available to handle rods, tubes, and chuck stock or parts. This lathe is said to step-up production on the final finishing of Ball Bearing Races, Headless Set Screws, Gears, Pinions, Pulleys, Spinning Rings, Screw Machine Products of all kinds, Wire Drawing Dies, and similar small parts.

Speed Lathe
Heavy machinery is not diverted.

Hanna
Pneumatic Squeeze Riveter (E5)

Designed especially for aircraft sub-assembly riveting is a new stationary pneumatic squeeze riveter of the pedestal type built by the Hanna Engineering Works, 1765 Elston Avenue, Chicago. This riveter is capable of exerting ten tons on the rivet at eighty pounds air pressure, and is recommended for driving quarter inch diameter aluminum alloy rivets, although it is available in a variety of sizes.



Pneumatic Squeeze Riveter
For aircraft sub-assemblies.

The ram is actuated by means of a pneumatically operated mechanism of the wedge and roller type. The rated pressure of the riveter is exerted thru a considerable portion of the 1½" ram travel. When the ram enters the uniform pressure zone its initial rapid travel is automatically reduced, permitting the rivet to flow and fill the hole with the forming of the rivet head following automatically.

The complete mechanism is demountable, permitting modifications in the yokes or frames as the work may necessitate from time to time. The return of the piston is spring actuated, effecting economies in air consumption.

(Continued on following page)

RATED AS ESSENTIAL *for* DEFENSE PRODUCTION

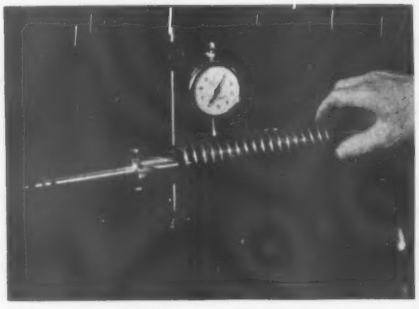
SHOPS DOING DEFENSE WORK ARE FINDING THESE STARRETT TOOLS EXTREMELY HELPFUL

★ "AS NECESSARY AS SKILLED MEN"

is the way these Starrett Vernier Tools are rated. Leading shops find Starrett Vernier Calipers, Height Gages and Depth Gages in constant use in toolrooms, die and mould departments and for all inspection work. Complete Vernier Tool equipment is a sound, long-term investment.

★ SPECIAL MICROMETERS IN DEMAND

Extra large sizes for armament and marine work, special shapes for sheet metal and aircraft operations, special features for production measuring and inspecting operations — these are the types of Starrett Micrometers finding wide use on defense work today. The more than 300 different models in the complete Starrett line makes it easy to select the one best Micrometer for any job.



★ TEST INDICATOR EXTREMELY USEFUL

Toolmakers, machinists and inspectors are using Starrett Dial Test Indicator No. 665 more than ever. Extreme simplicity, flexibility and ease of adjustment make it the right tool for countless testing, inspecting and comparing operations. Can be used on base or in machine tool posts. Has many special attachments. Dial reads 0-25-0 in half-thousandths with a range of 3/10". Large, clear face; sharp, clean calibrations insure easy, accurate reading.

★ WHERE TO FIND THE TOOLS YOU NEED

Starrett Catalog No. 26 "T" lists more than 3500 Precision Tools, Dial Indicators, Steel Tapes, Rules and Hacksaws which are available through leading supply houses. Make the Starrett Catalog your buying guide. Write for a copy.

THE L. S. STARRETT CO.

World's Greatest Toolmakers

Precision Tools.. Dial Indicators.. Ground Flat Stock Hacksaws.. Metal Cutting Bandsaws.. Steel Tapes

ATHOL, MASSACHUSETTS, U. S. A.

AVAILABLE THROUGH ALL LEADING SUPPLY HOUSES

STARRETT TOOLS

Frantz
Ferrofilter (E6)

For filtering iron particles from oil a Permanent Magnet FerroFilter is offered by the S. G. Frantz Co., Inc., 161 Grand St., New York, N. Y. The FerroFilter consists essentially of a set of magnetized screens enclosed in a casing, through which the liquid flows. The screens, although offering comparatively little resistance to the flow, present hundreds or even thousands of feet of strongly magnetized edges to the materials passing through. These are said to comb and recomb the product giving an extremely high efficiency of removal of magnetic particles, which are retained on the screen edges until the end of the run. The FerroFilter is then demagnetized and flushed.

Ferrofilter
Little resistance to flow.

The filter is said to catch particles as small as one micron, while the open flow passages allow high capacity in small space, resulting in low-cost treatment.

The Ferrofilter finds its principal use in lubricating oil and cutting oil circulating systems. Iron particles in the oil have two kinds of harmful effects—mechanical and chemical. If the oil contains iron particles they give it an abrasive action which accelerates wear, and iron serves as a catalyst to accelerate oxidation of the oil.

DoAll
Precision Surface Grinder (E7)

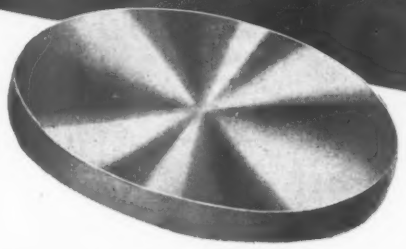
A new Precision Surface Grinder, the result of two and a half years of development work, is announced by Continental Machines, Inc., 1304 S. Washington Ave., Minneapolis. The base of the machine weighs 815 pounds and is of full box construction. Box and table are made of alloyed cast iron. Table movements both longitudinal and cross are hydraulically driven, insuring smooth operation. A built in dial indicator registering in tenths of thousandths augments hand wheel feed, enabling the operator to grind to extremely close limits.

Surface Grinder
2½ years became 815 pounds.

The indicator is coupled directly between the wheel head and table, thus giving a direct reading of any movement of the grinding wheel relative to the work being ground. Table travel is infinitely variable from zero to 50 f.p.m. Cross feed is variable from zero to 150 thousandths at each reversal of table travel. A built in cold fluorescent type lamp provides a soft illumination to the table which is helpful in bringing the grinding wheel in contact with the work.

(Continued on following page)

Cuts Non-Ferrous Metals with POLISHED Smoothness



New Delta Low Cost CUT-OFF MACHINE

This new Delta Cut-Off Machine is designed especially for cutting copper, brass, aluminum and other non-ferrous metals with polished smoothness. It is equipped with a special high-speed steel blade and oiling device which feeds cutting oil to the blade. It leaves the cut perfectly smooth, thus eliminating additional finishing and polishing operations. Here is a powerful, accurate machine made available at a fraction of the prices customarily charged for machines of this type. It can be used anywhere, in large shops or small, where non-ferrous metals have to be cut to accurate length on a production basis.

Cuts These Materials

Solid Sections: Soft Brass up to 1½" diameter; Half-Hard Brass, up to 1¼" diameter; Aluminum, up to 1½" diameter; Aluminum Extruded Sections, up to equivalent of 2 sq. in.; Copper, up to 1½" diameter, or equivalent of 2 sq. in.; Magnesium (Dow Metal), up to 1¼" diameter; Micarta and Similar Rods, up to 1½" diameter.

Tubular Sections: Soft Brass, Hard Brass, Aluminum, Copper, Dow Metal, Micarta and Similar Tubing, all up to 2" diameter.

Many Special Features

This improved Cut-Off Machine is ruggedly constructed with heavy castings throughout—wide spaced Timken roller pivot bearings and double arbor sealed-for-life bearings requiring no lubrication—powerful Texrope V-Belt drive—adjustable fence—accurately machined table. It is perfectly balanced, making for easy operation—cuts material at any angle and embodies unusual safety features such as husky chip guard, belt and wheel guards.

No. 1631 Non-ferrous Cut-Off Machine. With blade guard, belt guard and chip guard.

Send for Special Cut-Off Machine Bulletin

giving full details and prices on this Delta Cut-Off Machine and all accessories.

DELTA MFG. CO.
(INDUSTRIAL DIVISION)
626 East Vienna Avenue, MILWAUKEE, WIS.

Delta Manufacturing Company
626 E. Vienna Avenue, Milwaukee, Wis.

Please send me special bulletin on the new Delta Cut-Off Machine for non-ferrous metals. Also send latest Delta Catalog of Industrial Power Tools.

Name .....
Address .....
Firm .....
City ..... State .....

Skilsaw
Compact Belt Sander (E8)

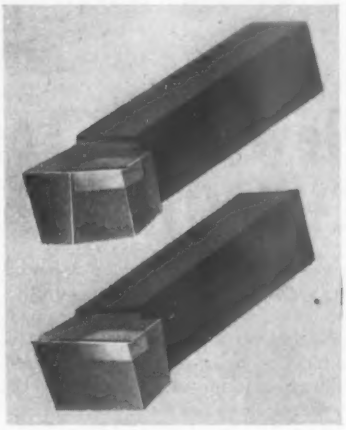
A lightweight 2¼ inch belt sander called "Zephyrplane Junior" has recently been introduced by Skilsaw, Inc., Chicago. The sander has a die-cast aluminum frame for lightness and strength, ball-bearing construction, and a universal motor. Other features include a bakelite handle, a safe trigger-type momentary switch and a patented "touch-control" lever which permits quick changing of belts. The belt travels at a speed of 600 surface feet per minute, is kept uniformly taut by a coil spring, and can be easily centered by a simple adjustment.

The sander is said to provide perfect balance so that uniform pressure is applied over the entire sanding area—helping produce a smooth, ripple-free surface, faster and more easily than by hand sanding.

Belt Sander
Produces a ripple free surface.

Kennametal
Turret Lathe Tools (E9)

Two new styles of tools for facing operations in turret lathes have been added to the standard line of McKenna Metals Co., 600 Lloyd Ave., Latrobe, Pa. Known as Style Nos. 21 and 22, these tools have



Lathe Tools
Use a negative back rake.

6° side and front clearance angles, 8° end cutting edge angles, 6° side rake and 2° negative back rake. Style 21 tool has a 20° side cutting edge angle which results in tool life and therefore this tool should be used where a 90° shoulder on the work is not required. For facing to a 90° shoulder, Style 22 tool, which has a zero side cutting edge angle, should be used.

Use of the negative back rake is said to strengthen the carbide tip.

Western
Multi Motor Mounting (E10)

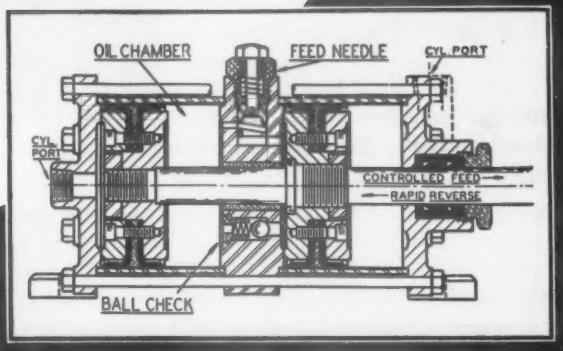
A Multi Motor Mounting which provides for individual motor installation on all types of used machine tools is announced by Western Manufacturing Company, 3406 Scotten Ave., Detroit.

The mounting accommodates all NEMA frames 204 to 326, including practically all Canadian, British, South American and overseas motors, together with older and special motors up to ten H. P. used in the United States. No extra plates or rails are necessary, motor installation time is reduced to a minimum, it is claimed, and provision has been made for the take-up of V-belts between motor and transmission.

(Continued on following page)

"LOGAN" AIR-DRAULIC CYLINDERS

NEW ★ REVOLUTIONARY ★



OPERATED BY AIR - YET ALL HYDRAULIC FEATURES RETAINED

Industry has long needed a cylinder that combines the speed of an air cylinder with the smooth, steady cushioning action of a hydraulic cylinder. "LOGAN" Air-Draulic Cylinders retain all of the best features of both. They are adaptable wherever air pressure is available as a power means. The hydraulic regulating action is self-contained, providing a smooth flowing feed stroke, either continuous or adjustable. These new "LOGAN" Air-Draulic Cylinders are ideal for the operation of machine slides, drilling heads, work holding tables or machine operations requiring controlled movements. Write today for Bulletin 470 giving complete information.

LOGANSPORT MACHINE, INCORPORATED

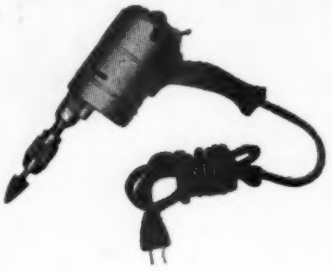
902 PAYSON ROAD, LOGANSPORT, INDIANA

Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Presses and Accessories

Paramount
Electric Tool (E11)

A versatile electric tool is offered by Paramount Products Co., Dept. 2-10, 545 Fifth Avenue, New York City. This tool, which operates on either A.C. or D.C., is said to be adaptable for drilling, grinding, sharpening, wire-brushing, sanding, polishing, sawing, shaping, etching, engraving, and carving.

The tool itself is of small, die cast construction with a heavy duty motor and built in cooling fan. The total weight is about three and a half pounds. Various accessories may be secured for adapting the tool to different operations.

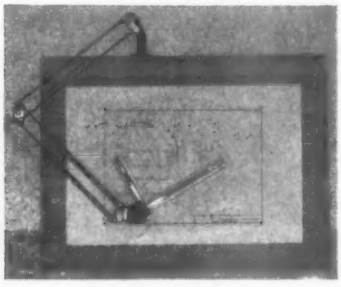


Electric Tool
Total weight of 3½ pounds.

Drafto
Drafting Machine (E12)

The Drafto Company, 110 Walnut St., Cochranton, Pa., announces production of a new, low-priced drafting machine, designated as the "Master-Drafto" Model No. 60, which takes a maximum size sheet 24 x 36 inches.

Light in weight for ease of operation, the Master-Drafto is solidly built to stand hard use. The arms are constructed of seamless steel tubing, fitted with solid bearings. The scale blades are designed so that any scale, either boxwood or aluminum, can be inserted. These scales will fit tightly into the blades without deviating from the necessary 90 degree angle.



Drafting Machine
Accurately set to ½ degree.

An outstanding feature of this drafting machine is its protractor device. The stainless steel protractor plate is graduated in 2 degrees, and can be set accurately for ½ degree readings by use of the graduated vernier.

Pratt & Whitney
Gun Barrel Chambering Machine (E13)

The No. ½B Gun Barrel Chambering Machine offered by Pratt & Whitney, West Hartford, Conn., has been improved as machine tool practice has advanced. The machine performs the various operations in the butt end of a previously drilled, reamed, and rifled gun barrel to form the accurate chamber which receives the cartridge. The gun barrel is held at one end in the work spindle by a lever operated collet chuck. Its outer end is supported in an adjustable lathe type steady rest with spring operated jaws allowing the barrel to float to overcome eccentricity.

The turret of the machine contains ten tool spindles. Each is fitted with a tool adapter which includes a nut and lock nut, adjustable lengthwise, which acts as a depth stop as the tool is fed into the barrel. A special collar threaded to the end of the barrel meets these depth stops.

(Continued on page 40)

HELPING SOLVE INDUSTRY'S PRODUCTION PROBLEMS

Taking the guesswork out of TOOL INSPECTION

Measuring machines developed by "Illinois Tool" engineers made possible the accurate checking of cutting tools!

Correct sharpening is the most important factor affecting the accuracy and productivity of metal cutting tools.

Hobs, shaper cutters and other tools that generate a conjugate profile on the work can be a complete failure if sharpened incorrectly. Similarly, milling cutters, formed cutters and other rotary cutting tools will deliver more accuracy and dollar value if all cutting teeth do an equal share of the work.

The only way to indisputably determine whether all cutting teeth are "workers" instead of "shirkers" is to check each tool after sharpening on fundamentally sound inspection equipment. It will pay you to investigate the economic benefits of an installation of ILLINOIS Measuring Machines in your tool grinding department.

ILLINOIS
MEASURING MACHINES FOR CUTTING TOOLS

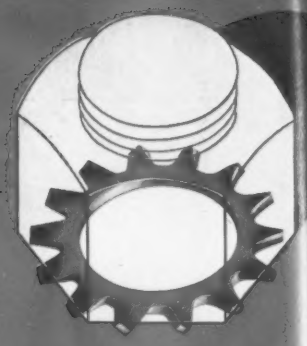
Universal Cutter and Hob Measuring Machine
Hob Lead Measuring Machine
Hob Tooth Profile Measuring Machine
Universal Hob and Worm Measuring Machine
Shaper Cutter Sharpening Inspection Fixture

ILLINOIS TOOL WORKS

MANUFACTURERS OF METAL CUTTING TOOLS AND SNAKEPROOF PRODUCTS

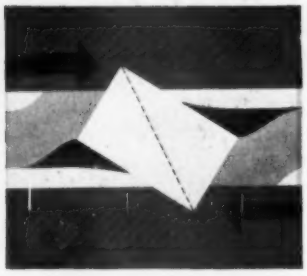
2501 N. KEELER AVENUE, CHICAGO, ILLINOIS · IN CANADA: CANADA ILLINOIS TOOLS, LTD., TORONTO, ONTARIO

Give your product the positive protection of *Multiple Locking!*



SHAKEPROOF

LOCK WASHERS



Easy to handle—can't tangle—won't spread!

Locks tight with only 1/4 turn of wrench or driver.

EACH TAPERED-TWISTED TOOTH ACTS AS A POWERFUL LOCKING STRUT!

When a nut or screw is turned down tight on a Shakeproof Lock Washer, each tapered-twisted tooth bites into both surfaces. When vibration attacks and the nut or screw attempts to loosen, it is stopped by the powerful strut-action of each tooth. As vibration increases, the teeth bite in deeper and, regardless of how severe the vibration becomes, the nut or screw stays locked tight. That is why Shakeproof Lock Washers offer you the maximum in vibration protection. That is why they are known today as "the standard of locking efficiency!"

FREE SAMPLE RING...

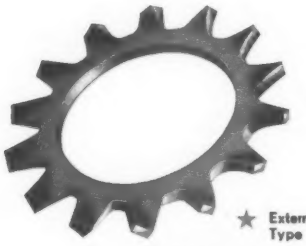
Here is your opportunity to test Shakeproof Lock Washers yourself. This handy ring carries an assortment of popular sizes and types and is yours for the asking—write us today!

SHAKEPROOF LOCK WASHER CO.

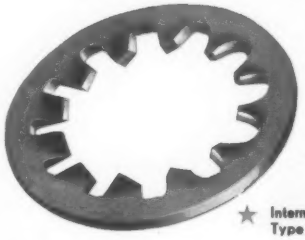
Distributor of Shakeproof Products
Manufactured by **ILLINOIS TOOL WORKS**

2501 North Keeler Avenue, Chicago, Illinois

Plants at Chicago and Elgin, Illinois
In Canada: Canada Illinois Tools, Ltd., Toronto, Ontario



★ External Type



★ Internal Type

★ Countersunk Type

★ External-Internal Type

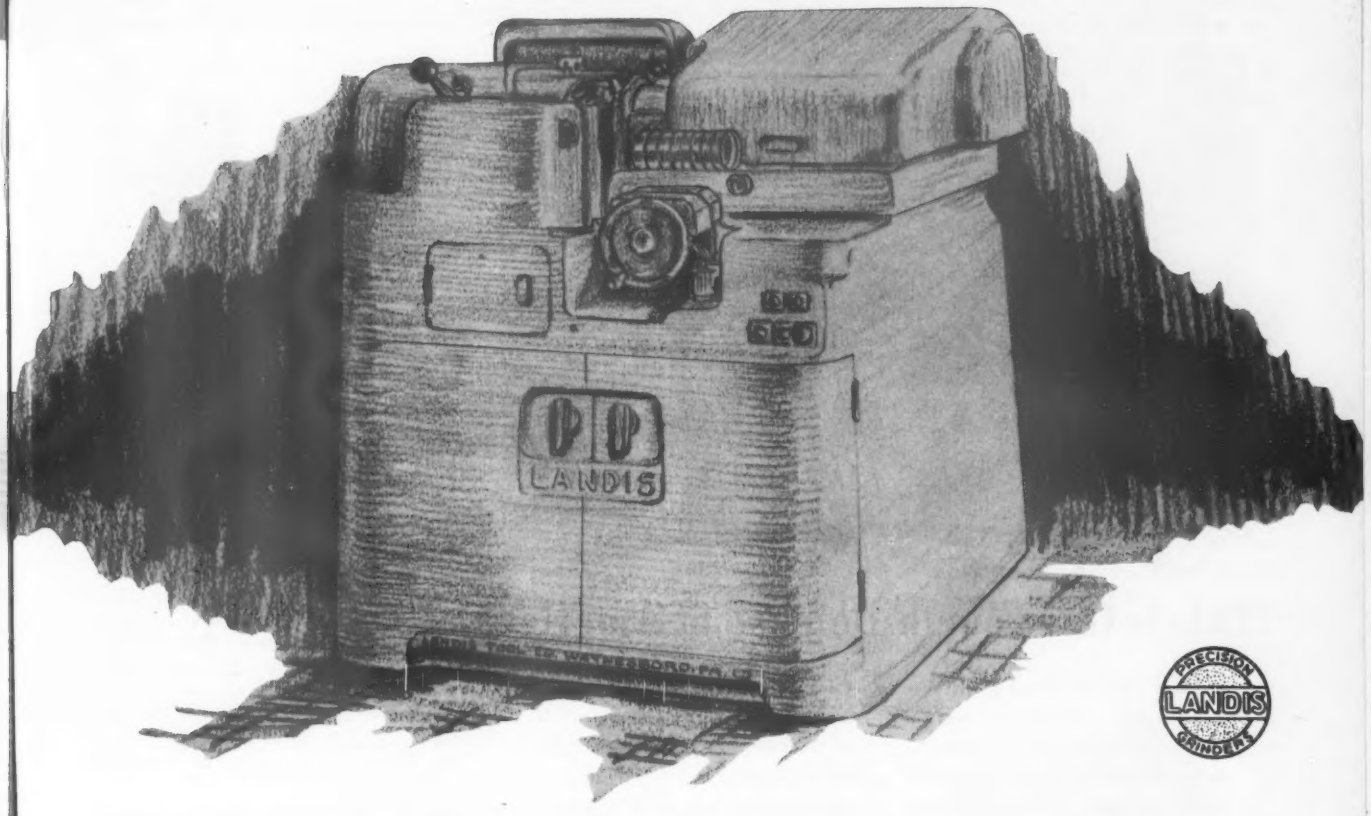
"*Fastening* SHAKEPROOF *Headquarters*"

SEMS Fastener Units . . . Lock Washers . . . Locking and Plain Terminals

Thread-Cutting Screws . . . Locking Screws . . . Spring Washers . . . Special Stampings

Shakeproof Lock Washers are carried in stock by leading industrial distributors!

HOW SHALL I GRIND MY BALL RACES



WITH THE LANDIS No. 2 RACE-A-WAY GRINDER

Because of its range. Tooling may be had for internal grinding the raceways of outer races or external grinding the raceways of inner races. Sizes up to and including the 409 group may be internal ground and up to the 414 group external ground Both single and double row types may be handled.

Because of its performance. Automatic sizing assures the consistent holding of closer than average limits. One man may easily operate two machines.

Because of its appearance. Really different. Streamlined, with outside of bed devoid of levers, attachments and control boxes. Pleasing to look at—safe—easy to keep clean.

A closing thought for ball bearing manufacturers. Want to keep your costs up? Then, continue **not** to use the Landis No. 2 RACE-A-WAY. No. 358

LANDIS

WAYNESBORO *Tool Company* PENNSYLVANIA

Commonwealth
Soren Varitime (E14)

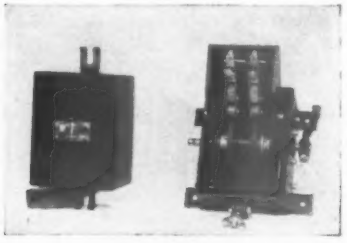
A new instrument known as the Soren Varitime has been announced by the Commonwealth Engineering Company of Ohio, Dayton. This device can be used to vary the speed of synchronous motors, and also to test such motors as to their speed.

The Soren Varitime supplies a voltage of a controllable variable frequency and to also supply power to operate electrical devices. It provides an adjustable frequency range of from 18 to 240 cycles. It is housed in a sturdy steel cabinet, the 30 watt model weighing about 20 pounds. It is capable of adjusting the speed of synchronous electric motors over a five to one range.

Soren Varitime
Supplies a controllable frequency.

Westinghouse
Cam Limit Switch (E15)

A new cam-operated limit switch with contacts arranged to swing open for easy inspection and maintenance, and designed especially for control circuits of such devices as hoists and industrial trucks, is announced by the Westinghouse Electric & Manufacturing Company, Dept. 7-N-20, E. Pittsburgh, Pennsylvania.



Limit Switch
Micarta fingerboard contacts.

Special feature of the new switch is the Micarta fingerboard on which the contacts are mounted; it swings upward out of the case for easy connecting, inspection and maintenance.

Operation is by means of a cam-shaft on which rollers travel. These rollers make or break the contacts at any point on the travel. The switch may be actuated either by a revolving shaft coupled to its cam shaft, or by the movement of an operating lever attached to the cam shaft. The moving contacts are self-aligning, with a compensating type operating finger.

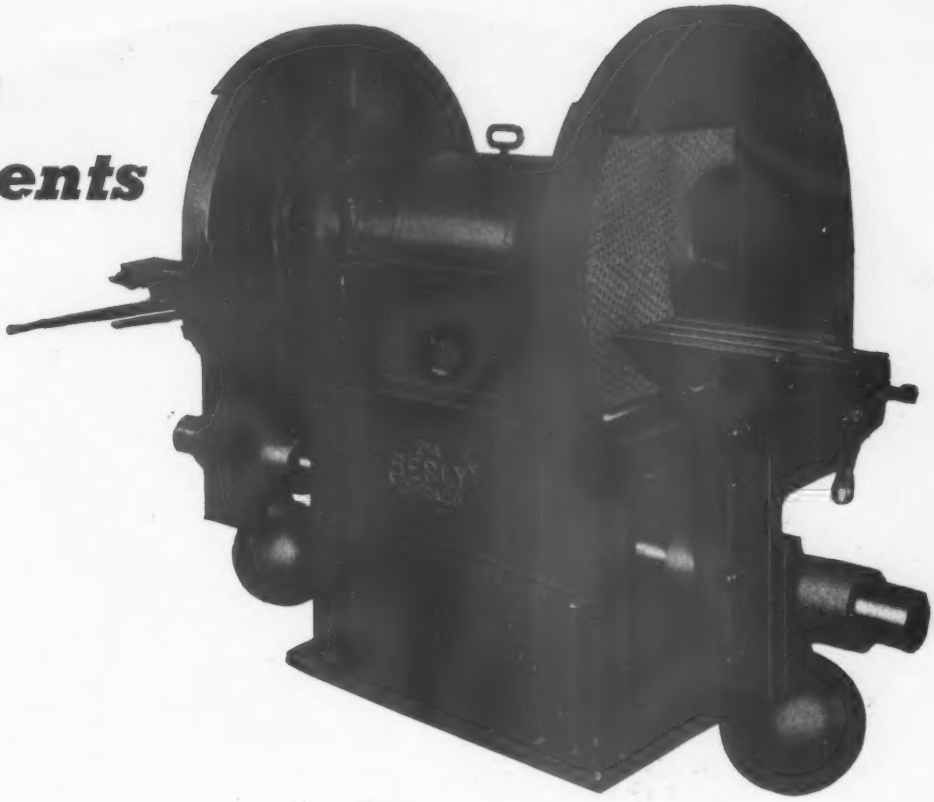
Key Numbers are for Your Convenience
Use them on Postcard in this issue.

New Process
For Extruding Plastics (E16)

In keeping with the rapid developments made by the use of plastics in the industrial fields, the Detroit Macoid Corporation announces the perfection of a new process for extruding plastics.

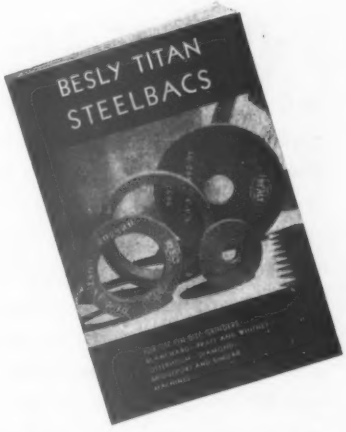
The company states that by this new method it is possible for them to manufacture individually designed moldings, strips, tubing, rods, etc., in continuous lengths. Prior to this new development the length of a plastic strip was limited. Die costs for individually designed pieces are said to be extremely nominal. Other advantages claimed for this new plastic process are economy, smooth lustrous finish, low heat conductivity and imperviousness to changing climatic conditions.

Besly *Presents*



The Disc Grinder with real production possibilities. This massive rugged Besly Grinder turns out work at an amazing rate. Equipped with Besly Titan (Bolted-On) Steelbac Abrasive Discs, forty inch diameter, two or three inch thick. Served by Geared Lever Feed Tables with 20 to 1 ratio. Can you visualize its capabilities? The Wheel Collars are twenty-two inch diameter—Rockershaft carrying the Tables four and one half inch—Spindle almost four inch where it is mounted on highest grade Ball Bearings. It will effect wonderful economies and increase production in your plant. Its 25 H.P. Totally Enclosed Fan Cooled Ball Bearing Motor transmits power to spindle through eight Vee Belts. Heavy Welded Steel Hoods protect the operator. Built also in smaller sizes with Abrasive Discs down to 18 inch diameter. All these Besly Grinders remove stock with astonishing speed and the improved grinding members (Besly Titan Steelbac Abrasive Discs) effect marked savings in abrasive costs.

Get further details on what the modern Besly Grinder will do for you.



Write for your copy of Booklet on Besly Titan Steelbacs.

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JUST AS EASY TO FOLLOW AS A STRAIGHT CUT

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Other controls are just as convenient and easy to manipulate, fairly inviting the operator to turn out more work. Catalog M-865 gives you the complete story of the accuracy, productivity, and easy control of CINCINNATI 28″ Series Vertical Hydro-Tel. Write for your copy today.

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Production Perspectives

News of Mass Manufacturing Everywhere

THE new defense high command at Washington set as its goal maximum production "in every field which can contribute to victory" and asked for cooperation of "every element in the American community." The expression of purpose was made by William S. Knudsen, director of the office for production management for national defense, in a statement at the close of a day which saw these concrete steps in the rearmament program: Extension of the export control system to 15 additional items, including chemicals useful in production of war gases and aviation gasoline. Placing of navy orders totaling $284,218,700 for 60 submarine chasers and auxiliary vessels. Included were four ships designed for placing anti-submarine nets at entrances to strategic harbors. Selection of a site at Tulsa, Oklahoma, for a plant which will assemble planes from parts made in automobile factories. Similar plants already have been allocated to Omaha, Neb., and Kansas City, Mo. A fourth is to be built also in the west, giving the group a capacity of 3,600 bombers a year. Award of a $6,756,399 contract to the Hercules Powder Co. of Wilmington, Del., for operation and equipment of a powder bag loading plant near Pulaski, Va. This plant will operate in connection with the $36,000,000 powder plant the same firm is building for the government at Radford, Va. Knudsen asked the American people to recognize "the full gravity of the crisis" in the world and "figuratively to pull off their coats and roll up their sleeves and give their concentrated, undivided attention to one thing—the swiftest possible production of means of defense." He said "the contest which produced this crisis is irreconcilable in character and cannot be terminated by any methods of appeasement."

THE New England Council has issued appeals for "more expansion, more speed" by Industry of the six Northeastern States in filling defense orders totaling $1,500,000,000.

Council President Ralph E. Flanders called upon the area's business and industrial leaders to act immediately on the plea of William S. Knudsen, national director of production.

Flanders, who is president of the Jones & Lamson Machine Works, Springfield, Vt., said some large companies had been found laggard and some small plants did not show the proper initiative in seeking sub-contracts though "public opinion in New England is overwhelmingly for a defense which includes all possible aid to Britain short of the use of our armed forces."

In industries, such as aircraft, shipbuilding and machine tools, Flanders said, the problems of private business must be forgotten and expansion must proceed rapidly with no limits except "those set by effective production."

Failure of government officials to determine requirements and furnish an orderly delivery schedule was blamed for the lag in machine tool production by Clayton R. Burt, chairman of the National Defense Committee of the National Machine Tool Builders' Association.

In a statement, Burt, who is president of the Niles-Bement-Pond Company, Hartford, Conn., makers of precision tools, praised the outspoken criticism by William S. Knudsen of the national defense efforts.

Commenting on William S. Knudsen's plea for greater defense production, Roe S. Clark, vice president of the National Metal Trades Association, suggests that the National Defense Advisory Commission urge all U. S. industry, large and small, to appeal to employes for speed-up suggestions.

Using as a basis the "Suggestion Box" experience of the Package Machinery Company, Springfield, Mass., of which he is a director and executive, Mr. Clark stated that of thirty production suggestions submitted by employes during the past three months, no less than six were found to be of practical value and were now in use.

He estimated that if every industrial concern in the country employing 50 or more men would use a similar method, a total of 7,000,000 suggestions would be received a year, of which more than a million would probably prove practical.

Mr. Clark pointed out that employe inventions and suggestions played an important part in the last war. They would be of tremendous help today in overcoming the production lag, saving thousands of man-hours weekly, he said. In addition, he asserted, this system has the advantage of further stimulating individual effort.

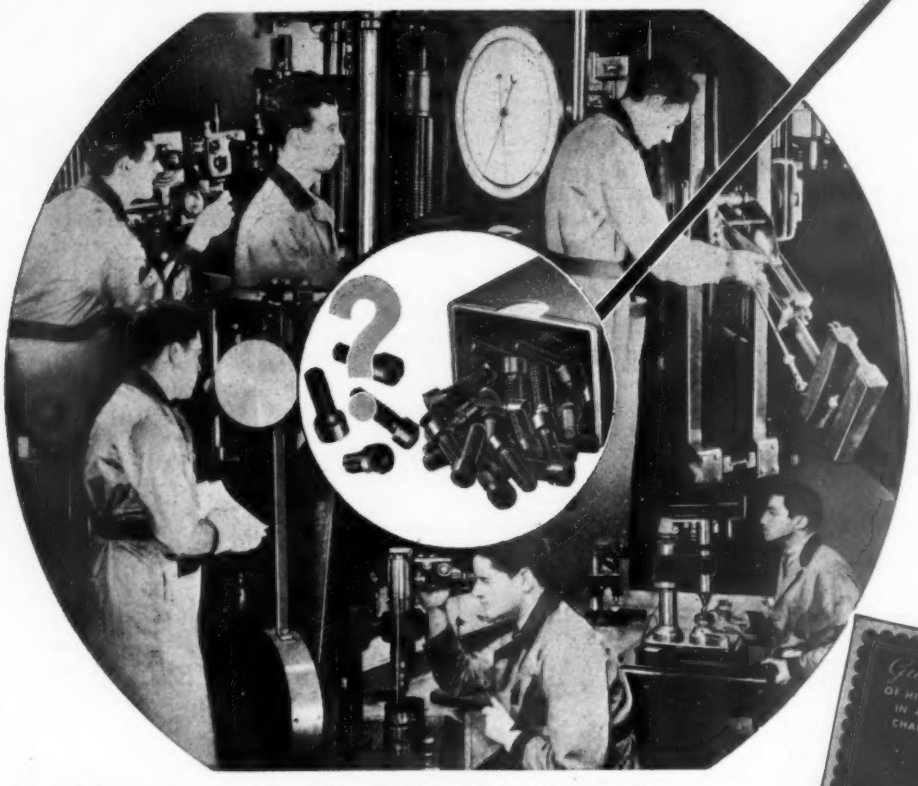
"If everyone of industry's eleven million workers can be made to realize the seriousness of the present crisis, and if every one, no matter what his position, is willing to do just

(Continued on following page)

All Out For Defense

"He claims the administration sent him to help speed up production."

WE'LL KEEP THE "Doubtful Few" OFF YOUR ASSEMBLY BILLS

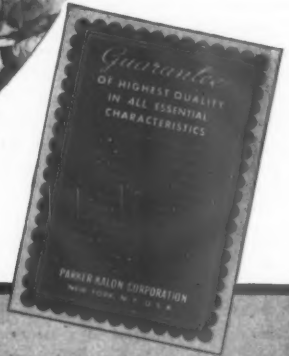


Parker-Kalon's Unequalled Quality-Control Laboratory eliminates the extra costs built up by "doubtful" screws

Fastening devices cost little . . . when they work right. When they don't, they cost plenty! The "Doubtful Few" . . . the imperfect units in a lot that won't drive properly, or fail in service . . . carry with them a high bill for extra time and labor, interrupted work and customer dissatisfaction.

To protect you against the cost-boosting "Doubtful Few", the Parker-Kalon Quality-Control Laboratory was established. Without counterpart in the industry, it makes it possible to hold Parker-Kalon Hardened Self-tapping Screws, Socket Screws and other fastening devices to higher standards than ever before could be attained!

Specify PARKER-KALON for fastening devices that ALWAYS WORK RIGHT AND HOLD TIGHT. Send for folder and free samples. Parker-Kalon Corp., 190-198 Varick Street, New York.



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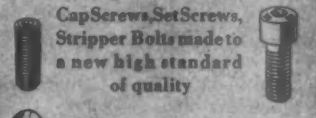
Types, sizes, head-styles for every assembly of metal or plastics

Cold-forged Socket Screws
Cap Screws, Set Screws, Stripper Bolts made to a new high standard of quality



Wing Nuts-Cap Nuts-Thumb Screws
Cold-forged . . Neater, Stronger

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Quality-Controlled **PARKER-KALON Fastening Devices**

a little bit more, then these production bottlenecks will be broken," Mr. Clark concluded.

SHORTAGE of skilled mechanics is facing Indian Motocycle Company, Springfield, with hundreds of thousands of dollars worth of orders on hand, Dwight L. Moody, general manager said. With a $500,000 order from the United States Army and large orders from several other governments, the plant will be as busy the first part of 1941 as it was with the large French order last year, Mr. Moody said. About 200 men will be added to the payroll, increasing employment to 750 men. Orders on hand are expected to keep the plant busy through May.

Equipment of the latest addition to the Pratt and Whitney Aircraft Corp. plant in East Hartford, Conn., is being started with 10,000 more hands to be added to the concern's payroll during the present year. The corporation now has about 20,000 workers. Plant officials already are looking forward to the weekly payroll passing the $1,000,000 mark. The corporation now is the largest single employer of labor in Connecticut and is believed to pay the highest average annual wages in that state. Reports are that deliveries of engines now are at a rate close to 1,000 a month and efforts constantly are being made to speed up that production. The new addition will use a conveyor belt system for distribution of materials and other requirements. The aircraft corporation is said to have reached its present output three months ahead of schedule and it has been able to make promised deliveries on the minute.

The Jones & Lamson machine shop in Springfield, Vt., has gone on a seven-day, seven-night schedule to keep up with defense orders.

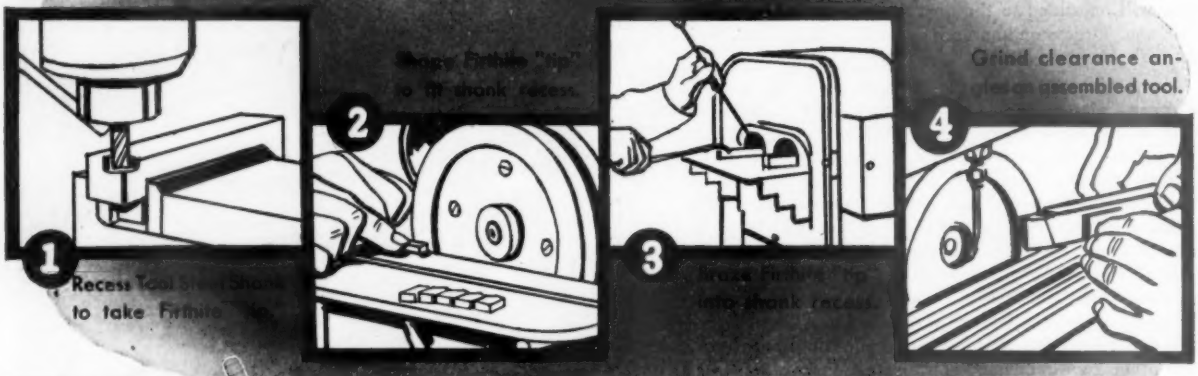
THE National Machine Tool Builders Association reported that the industry's capacity, based on pay roll hours, has risen 61.2 per cent since start of the European war. Machine tool index, also figured on pay roll hours, established another all-time high in December. December operations were calculated at 96.8 per cent, while capacity itself climbed 4 per cent above November. October operating activity, as in December stood at 96.8 per cent, but capacity increased 7 per cent by December. Thus, the association explained, December operations actually were far above October and all-time records are being established monthly.

K. T. Keller, president of Chrysler Corp., said at Detroit that his company, the Glenn L. Martin Co., and officials of the National Defense Commission had reached a tentative agreement under which Chrysler would produce parts and subassemblies for the Martin B-26 medium bomber. Through the cooperative efforts of the two companies, it is hoped to produce the planes at the rate of 100 a month in a new assembly plant to be built at Omaha, Neb. Announcing a new order for 10,419 specially designed trucks for the United States Army, Chrysler disclosed earlier that army orders received by the corporation in its United States and Canadian plants during the last 12 months totaled more than 57,000 units. Their value was placed at more than $58,000,000.

Fort Worth, Texas, was selected as the site of a fourth bomber assembly plant. Under arrangements which were well advanced before a new proposal to build "500 warplanes a day" was put forward with the support of the C.I.O., the Fort Worth plant and others assigned to Tulsa, Omaha and Kansas City will turn out 300 long-range bombers monthly from parts largely fabricated in motor car factories. The Tulsa and Fort Worth plants will be built by army engineers. Each is expected to cost up to $10,000,000.

Make your own FIRTHITE TOOLS

IN 4 EASY OPERATIONS!



For tool rooms or plants not equipped with apparatus for brazing single point tools, Firth-Sterling offers 2 models of BRAZE-RITE Furnaces specially designed for this work. Information about this equipment, as well as equipment for brazing multi-tipped tools, is available upon request.

Sintered Carbide Cutting Tools are *essential* to the *faster removal of metal* in Defense machining jobs. The unprecedented demand for these tools increases daily . . . and *must not* be permitted to cause "bottlenecks."

No shortage of Sintered Carbide is anticipated. But to avoid possible delays in tool *making,* Firth-Sterling offers the *plan,* the *information,* and the *materials* with which Carbide Tool users may relieve existing or threatened small tool bottlenecks . . . right in their own shops!

Write for complete information about this simple, practical plan.

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Now is the Time to Look for and Guard Against

SABOTAGE ★

Focal point of efforts to prevent rampant destruction by saboteurs is John Edgar Hoover of the Federal Bureau of Investigation. Upon his buoyant shoulders rests the task of coordinating the far flung activities of the Bureau, of enlisting proper civilian cooperation, and of preventing the growth of that hysteria which the enemies of democracy foster.

★

By ROY T. BRAMSON

In Cooperation with the Federal Bureau of Investigation

★

SABOTAGE

Every Tool Engineer is in a position to be of particular help in curbing efforts at sabotage. Here's how.

TOOL ENGINEERS should not regard this country as neutral—or, even at peace. The United States has not entered the war—probably will not—but these are emergency times in which every effort will be made by this country to produce war supplies of every description from ships to planes and from guns to all manner of munitions. It is now apparent that our present effort is to make sure that we are prepared for any emergency which might arise should England fall. President Roosevelt disregards the idea that the war abroad will end with the conquest of Britain. This means a positive and concerted effort in arming and probably involves every plant employing Tool Engineers.

In the early part of last September the Chief Executive realizing that investigation pertaining to sabotage, espionage, neutrality violation and related matters must be conducted in a comprehensive and effective manner on a national scale, called upon all law enforcement agencies to cooperate with the Federal Bureau of Investigation. At that time he stated "To this end I request all police officers, sheriffs and all law enforcement officers of the United States to promptly turn over to the nearest representative of the Federal Bureau of Investigation any information obtained by them relating to espionage, counter-espionage, sabotage, subversive activities and violations of the neutrality laws."

That there are saboteurs amongst us is indicated by the increase in investigative work pertaining to national defense. In the five year period preceding 1938 the FBI investigated an average of thirty-five espionage matters each year. In the year 1938, 350 such cases were handled by the Bureau, while in the year 1939 a total of 1651 such matters were received for investigative attention. With the outbreak of the war in Europe this type of work increased materially and on one day in May last year a total of 2871 complaints were received. To cope with this heavy demand on the services of the Federal Bureau of Investigation, new field offices have been opened in strategic cities and a large increase in Special Agent personnel has been made.

FBI Plant Surveys

At the request of the Army and Navy Departments, the FBI is engaged in a plant survey program which was undertaken in the fall of 1939. It was deemed advisable to formulate a program whereby the FBI would undertake inspection of protective facilities of a number of American basic industries whose products were considered to be essential to the operations of the Army and Navy Departments. The war and Navy Intelligence Divisions furnished to the Federal Bureau of Investigation a list of many hundreds of key industrial facilities. Included on this list were only those plants currently engaged in the manufacture of supplies of an urgent nature for the War and Navy Departments. Additional industrial units are being added constantly to this original list. Agents of the FBI assigned to this type of investigation were sent to Washington and placed in a special training school operated in connection with this project. The curriculum of this school included technical subjects of particular interest and cases involving sabotage, chemistry, explosives, document examination, bacteriology and codes, as well as many other pertinent subjects were taught by experts of the FBI Technical Laboratory.

After the plants are carefully surveyed, reports are submitted to Washington where they are reviewed by experts on fire hazards, structural security and other factors contributing to adequate protection. Immediately thereafter Director J. Edgar Hoover submits a comprehensive list of recommendations to the appropriate executive of the industrial plant, with recommendations based on the survey report. The cooperation of the various executives of the industrial plants which have been surveyed has been outstanding. Their willingness to put into effect the FBI recommendations has far exceeded expectations. Once the defects are pointed out, they have been glad to go to considerable expense to make appropriate changes. A very important phase of the FBI's program to detect the army of spies and saboteurs concerns the indexing of all leaders of subversive groups, together with their associates, as well as all known information concerning these individuals. A constant surveillance of all known or suspected foreign agents of the United States is also maintained. Industrial accidents in plants in the priority category are being given special attention. All suspected incidents of sabotage or espionage, no matter how relatively unimportant they may appear, are investigated thoroughly.

Instances of Sabotage

Several instances can be cited which indicate the need for the survey program such as is being currently carried out by the Federal Bureau of Investigation. One particular plant manufacturing a secret war material had a standing order that those in charge of engineering were to guard blue prints and other important data with the utmost of care. The order was followed to the letter and each night the confidential plans were locked in a burglar-proof concrete vault. When the FBI special agent conducting a survey looked over the vault he found it to be impregnable except for the fact that a window of ordinary glass had been built into the rear wall of the vault. This window overlooked a small landing leading to the yard of the plant, and it would have been a very simple matter for an espionage agent to have entered the vault and removed the whole collection of confidential plans. When called to the attention of plant officials this condition was, of course, remedied immediately.

In an airplane plant a special agent of the FBI entered the factory after removing all identifications and moved through the plant without being challenged. He walked behind machine tools, work benches, into experimental rooms and drafting rooms without being questioned by anyone. It is apparent,

of course, that an espionage agent might be equally free to do the same. In another airplane factory no extensive precautions had been taken to protect a secret model which was being tried out in an experimental hangar before being delivered to the armed forces. One precaution which had been taken consisted of a partition at one end of the hangar, and a special agent conducting the survey in that plant found a large hole in this partition. When asked why the hole had been made and why it was not repaired, the engineer remarked that some of the employees had kicked the hole in the partition so that they could see the new experimental plane. The official of this plant was shocked at his own lack of foresight when it was explained that the hole might have been used just as well by a spy gaining technical information for transmittal to a foreign government.

Rumors of Organized Sabotage

The Federal Bureau of Investigation reports that regardless of rumors which have been circulated, there have been no *organized* acts of sabotage in the United States since the war began in Europe in 1939. The Bureau points out, however, that there is a very real menace of the saboteur and the spy and that this country should not allow itself to be lulled into a sense of false security. At the same time every effort should be made to keep our feet on the ground and not to jump at conclusions. On the other hand it is pointed out by the Bureau that many cases of actual sabotage have occurred, but these have been the efforts of individuals. At times disgruntled employees or those with a personal motive for the destruction of certain objects have caused damage. The sabotage attempts have not been the technically perfect efforts of organized groups or foreign agents.

Every saboteur leaves some clue. The FBI agents are expertly trained to find such clues and while the saboteur may elude capture for awhile it is almost inevitable that he will be caught sooner rather than later. The technical laboratory of the FBI forms an important cog in the machinery to fight the saboteur. Inspectors at an airplane factory recently discovered that a portion of the aluminum structure of the plane had been cut, as an act of sabotage which would have caused the destruction of the ship and perhaps the death of its pilot—if it had not been discovered. The FBI was notified and there were no clues pointing to the identity of the saboteur. A good many workmen had had access to the plane and it seemed to be a hopeless job. The FBI special agent investigating the case inspected the damaged airplane part then asked that all of the hacksaw blades in the factory be turned over to him. There were seventy-two in all, and these were shipped to the technical laboratory for appropriate spectrographic analysis. The spectrograph, which is so sensitive to color that it can pick out the position in the spectrum of the minutest particles, eliminated sixty-four of the blades and narrowed the investigation to the point where the owners or users of only eight blades could be listed as suspects. These particular blades were found to have aluminum particles on the cutting edge, thus making it likely that one of them had been used in the attempted sabotage of the airplane.

All manufacturers of essential material for national defense are urged by the FBI to cooperate by correcting all vulnerable points in their plants. In view of the fact that each industrial facility presents a different problem, it is impossible for the Federal Bureau of Investigation to make uniform recommendations for the protection of all plants. To assist those manufacturing establishments, however, which are not yet included on its survey list, the FBI has issued a confidential booklet entitled "Suggestions for Protection of

Preparing Specimen for Spectographic Analysis
Seventy-two were reduced to eight.

Industrial Facilities." This may be obtained by executives of such companies by communicating with Director Hoover in Washington, D .C., but receipts must be returned for copies which remain the property of the Government.

According to Director Hoover of the FBI, the saboteur employs as many methods as there are means of disabling industry, crippling power lines, and delaying the country's national defense preparations. Vital machinery may be damaged or destroyed by abrasives, chemicals, or explosives of various types. Raw materials as well as finished products may be the objects of the saboteur's efforts. Other possible acts may concern the theft or destruction of blueprints and other confidential data or injury to precision tools. Personnel injuries and attempts to pollute water and foodstuffs to be consumed by employees should be given consideration. Arson is a favorite weapon, and protection against this danger suggested by the FBI has included steps to eliminate undue negligence and existing fire hazards.

Likewise, the FBI has pointed out that espionage agents use a variety of schemes to obtain valuable information on our production facilities. Unable to attain their ends by purchase or theft, they may resort to more brazen methods such as interviews with employees.

Prior to the compilation of the confidential booklet on plant protection and the inception of any plant surveys, the FBI sent some of its selected officials into various sections of the country to make a detailed study of protective facilities and policies existing in representative industrial institutions. Based upon this survey and its wide experience in the field the FBI has been recommending that to protect against the spy and the saboteur particular attention be given by plant management to personnel and physical properties with special emphasis upon the handling of plans and blueprints and the care to be exercised in case bombs or explosives are encountered.

It is obvious that disloyal employees are in a better position to commit sabotage than an outsider, while the loyal employee can be of inestimable aid in protecting the plant properties. The FBI has pointed out that plant managers, accordingly, should consider personnel as the most important factor in plant protection. Recommendations and suggestions made by the FBI have covered such things as the establishment of a complete set of rules to be followed by employees and the full circulation and posting of such rules. It has also been recommended that by means of posters, plant publications and employees' meetings, the urgency of the current situation and the necessity of uninterrupted production can be emphasized so that there will be no diminution in employees' morale because of the most stringent plant regulations.

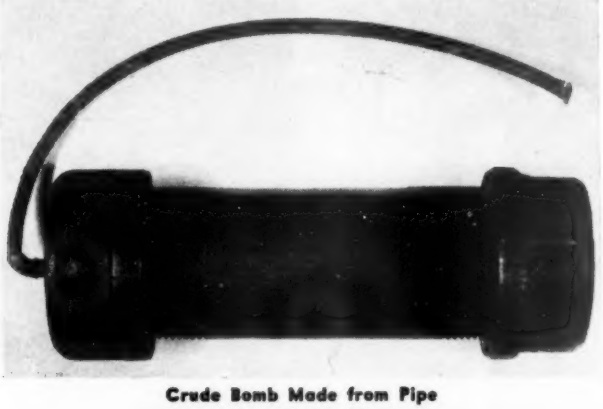
The FBI has emphasized the importance from the standpoint of plant protection of physical properties such as sidewalk elevators, outside fire escapes, railroad right of ways, and unfenced areas. In fact, adequate fencing, screening, and illumination are called the three most important factors in the prevention of unauthorized entry into plants. FBI recommendations frequently concern "restricted" areas which should be closed to all employees except those regularly employed in such sections. The care of technical and precision tools is stressed.

Use of Plan Room

According to Director Hoover, it is important that industrial plants working on confidential material have a plan office where all items such as blueprints and working models should be maintained in fireproof containers equipped with suitable locks. Important documents should be serialized, and it is suggested that plants maintain a rigid charge-out system which would reveal the location of documents at all times. The FBI advises that a thoroughly reliable employee who has been carefully investigated should be in direct charge of the plan office. It is further suggested that no confidential material should be retained in the possession of an employee after the shift on which he is employed is completed.

In view of the fact that bombs or infernal machines may be found in industrial plants, it has been suggested that each plant have readily available the names, addresses and telephone numbers of nearby explosive experts. Untold ingenuity is employed in the manufacture of infernal machines and the FBI cautions that experience has shown there is no safe method of handling all types of such mechanisms. As an indication of the danger in handling explosives found at plants, it might be pointed out that some will explode when moved, that others will explode at a specified time by means of a clockwork device and that still others are equipped with an acid timing device which will cause the bomb to explode if it is submerged in water. Of course, the protection of human life should be the primary consideration when a bomb is discovered.

Mr. Hoover points out that while guarding against sabotage and espionage, it is essential that we take a common-sense attitude toward the problems of sabotage and avoid all unwarranted excitement. Wild scares hamper industry and law enforcement in numerous ways. While the FBI desires the cooperation of all patriotic citizens, it does not want vigilantes. Every Tom, Dick and Harry should not be branded as a spy, nor should every person with a foreign accent be called a Nazi or a Communist. Individual citizens should not try to become amateur sleuths if they are interested in making America secure from the so-called fifth-columnist. Every citizen can do his part if he will leave the work of protecting the country in the hands of organized law enforcement and will report to the nearest FBI office any information coming to his attention indicating a possible violation of our National Defense Statutes.



Crude Bomb Made from Pipe
Commonly called a Pineapple.

TWO WAYS
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Take, for instance, a 12" gear with a 2" face, hobbed with ample stock for the correction of both hobbing and fire distortion errors. Its final overall error must not exceed .001".

METHOD A:

SPUR GEARS ONLY

Hob • Harden Grind

TOTAL MACHINE TIME
204 MINUTES

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SPUR OR HELICAL GEARS

Hob • Shave Harden • Lap

TOTAL MACHINE TIME
104 MINUTES

AND THAT'S NOT ALL

Method A is not only far more expensive but results in a high percentage of scrap due to surface checking of the teeth. It was abandoned years ago by practically all progressive automotive manufacturers and replaced by Method B which leaves the tooth surface unchecked and with a smoother, more accurate surface. Men responsible for production results are not inclined to do a job the wrong way, especially when it costs more.

Red Ring Gear Shaving and Lapping machines are found wherever modern gears are produced economically.

NATIONAL BROACH AND MACHINE CO.

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STEEL CAPACITY; DEFENSE HEADACHE

As steel production reached an all-time high last month, new orders came in with such force that delivery dates were moved forward to late spring and the industry's backlog grew bigger than ever. Thus began to crystallize a major industrial problem arising out of the Defense Program. Some government officials have repeatedly called for an additional 10 million tons of capacity in order that mounting domestic consumption as well as defense production may be handled.

Arrayed against the expansion program are steel company executives who believe present capacity to be adequate, and generally assert that if it isn't they would prefer a curtailment of consumer production rather than enlarge plants to a point where, in post-war let down, idle capacity might become an unbearable burden. Spokesmen for the industry place our defense needs at 7 million tons a year, British needs at 8 million, and other export needs at 5 million. With productive capacity for the entire industry now at about 83 million tons, this would leave 63 million for domestic requirements, more than ever has been used in this country.

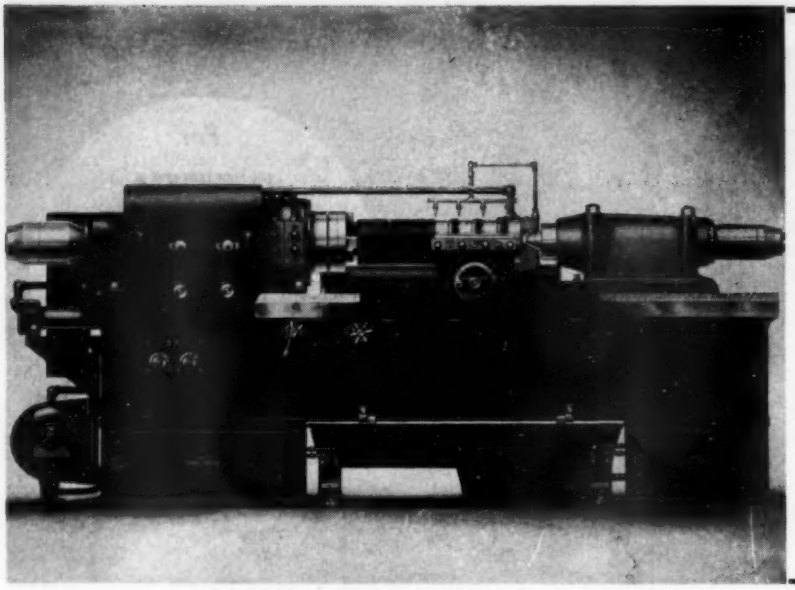
Government economists, on the other hand, estimate British needs at 27 million tons per year and our own defense needs at a like figure. That would leave for non-defense production only 29 million tons. Compare this with a domestic consumption in 1937 of 30 million tons by the automobile, railroad, container, machinery, and building industries alone.

Since both of these highly conflicting views cannot be correct, the Office for Production Management has appointed Gano Dunn, $1 a year engineer from the J. G. White Engineering Company, to survey the needs of various industries and arrive at a basis for arbitration of the dispute.

A minor note in this symphony of discord was struck when the C.I.O.'s Philip Murray charged that a handful of insiders was grabbing defense business, that 3 million tons of capacity still lay idle in smaller plants. Somewhat grudgingly, the Iron and Steel Institute admitted he was right.

But idle capacity meant little to jittery manufacturers who were unable to get delivery upon needed stock. Steelmakers, well aware that production has fluctuated from 92 per cent of capacity in 1917 to 19 per cent of capacity in 1932, could be counted on to oppose plant expansion so long as defense needs can be met by curtailing civilian demands. Government economists, seeking a minimum of unemployment and a maximum of consumer production, could be counted on to favor a 10 to 20 million ton increase in capacity. Appointed in preparation for what might lie ahead was a five man steel priorities board—the first step in the direction of a rationing of steel for consumer production.

Amidst all these forces moves bespectacled engineer Dunn, veteran of last summer's fight to expand the TVA. Awaiting the results of his analysis and the presentation of his report, the Great Debate recessed.



During the last war, Stanley Sparks designed and submitted to the Allied Governments a lathe for turning shells and guns. Of extremely simplified design, this lathe eliminated approximately forty per cent of the parts formerly used in a general purpose lathe. The lathe won the approval of the Allied governments and within four months machines were being delivered in volume. Thirty-two different plants cooperated in producing this lathe during the last war. Today Stanley Sparks is surrounding himself with some of the personnel that was used in the production of this Simplex lathe before. A plan has been worked out in cooperation with the Ordnance Department whereby numerous well-established manufacturers will cooperate in the production of parts and assembly of the new Simplex Shell Turning Lathe.

Shell Turning

A Defense Project of the First Magnitude

DESIGNED to perform all machining operations on all Shells from 75 MM to 155 MM is a lathe illustrated on this page. It will provide for multiple tooling and will carry tools and attachments which will enable it to produce as many as 5 distinct operations with one chucking and obtain maximum cutting speeds by the use of Tungsten Carbide Tools.

The Headstock Spindle is of the flange type for direct chuck mounting and rotates in heavy duty "Timken" Bearings. The O. D. of spindle at front end being 5" and 3½" at the rear. The spindle is operated through special steel gears with wide faces and dog tooth clutches and allows a drive of 75 H.P. motor maximum through a powerful silent roller chain. Smaller motors down to 10 H.P. are also available for operations requiring less power. Three spindle speeds are available to give maximum cutting speed required.

A separate hydraulic motor unit and pump is provided to give complete automatic operation of all feeds horizontal and cross as well as rapid traverse.

Through the adjustment of a dial mounted conveniently on front of machine, feeds are available from .008" to .040". Power hydraulic cross feeds are supplied independently of the longitudinal feeds, which eliminates the necessity for the use of any controlling cam feeds and simplifies the manufacture and operation of the lathe.

Operating from this same hydraulic power is the rotating cylinder which operates a wedge chuck through a draw bar and which was developed for this purpose by The Cushman Chuck Company. Suitable work holding Jaws as well as end stops and length gage bars are also a standard part of the chucking equipment. The chuck will be operated by a foot type valve in order to facilitate loading of Shell.

The tail center is operated through a hydraulic cylinder and through the medium of another foot valve conveniently located. This center is furnished as standard equipment as a live ball bearing center. A revolving roller bearing tailstock spindle is supplied as extra equipment.

Heavy duty, motor driven coolant pump is also supplied with large capacity.

A generous size chip pan is mounted under the bed on a swivel and can be easily cleaned from the back of lathe and a sump tank attached thereto to carry an adequate supply of coolant compound.

Such operations as facing ends and boring require a holding fixture of the pot type consisting of two three jaw Scroll Chucks with suitable spacers which center the shell accurately from its outside diameter.

(For diagrams illustrating the operation of this lathe, please see page 56.)

Shell

Illustrating the various operations performed, the method of holding tools

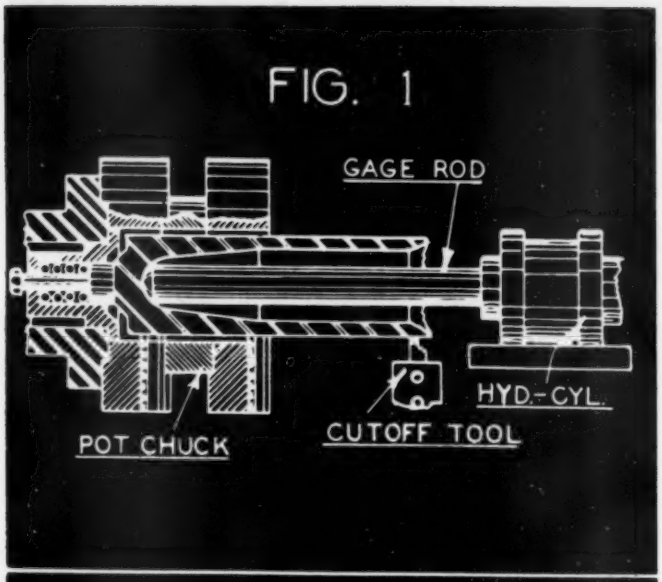


FIGURE I — Operation — Cut off open end and gauge for length
(1) Shell is held in a double pot chuck
(2) Hydraulic cylinder mounted on bed replaces tailstock and carries gauging rod
(3) Shell pushed against stop on gauging rod by a spring plunger in chuck
(4) Hydraulic power cross feed operates tool to cut off open end of shell to proper length from depth of hole.

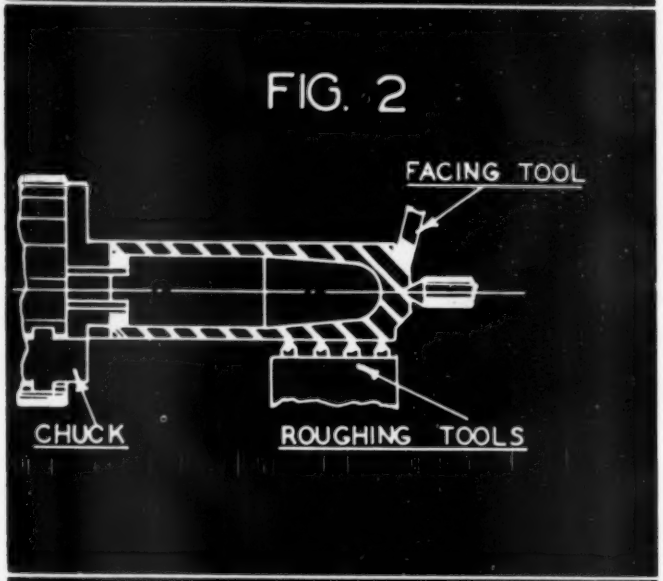


FIGURE II — Operation — Rough turn and face back end
(1) Shell held in hydraulic operated wedge chuck
(2) Rough turn outside of shell with four roughing tools in line
(3) Hydraulic feed with rapid traverse and power cross feed
(4) Hydraulic power operated facing tool mounted on back of machine for facing back end of shell.

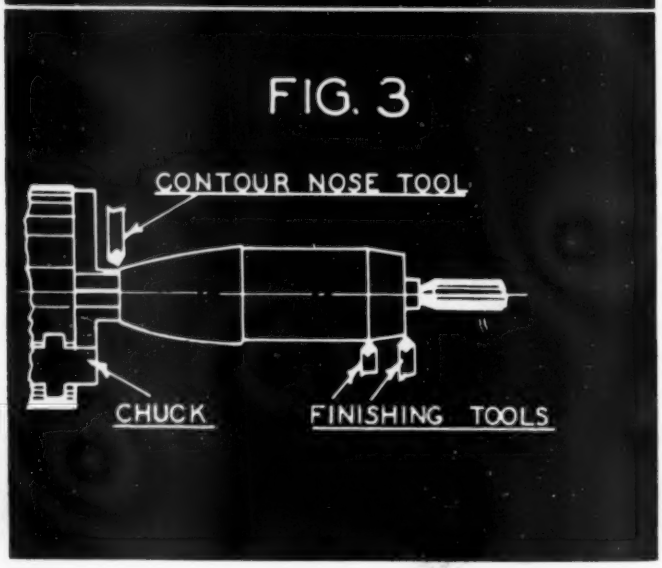


FIGURE III — Operation — Finish Turn Outside of Shell
(1) Shell is held in power wedge chuck
(2) Finish turn outside of shell with front finish tool front profiling tool working on back end of shell and back profiling tool working on nose contour
(3) Hydraulic feed with rapid traverse and power cross feed
(4) Hydraulic power operated profiling attachment on back of machine
(5) Taper attachment on front of machine

For National

Turning

and the Tooling Set-up for Use of the Simplex Shell Turning Lathe

FIGURE IV — Operation — Finish bore, face and tap nose of shell
(1) Held in pot chuck
(2) Turret tool post carries bore and outside chamfer tool, reamer and inside chamfer tool and collapsible tap
Turret station 1—bore and outside chamfer
2—ream and inside chamfer
3—tap
Hydraulic longitudinal feed.

FIG. 4

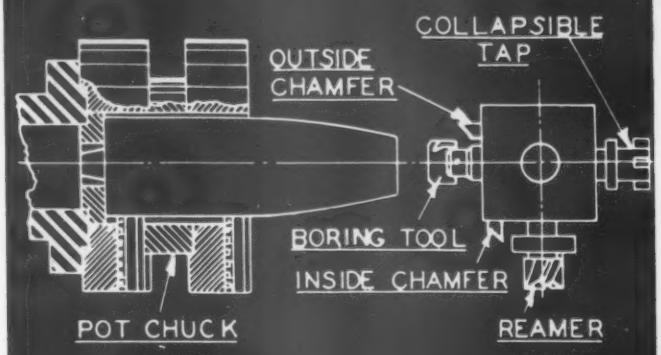


FIGURE V — Operation — facing back end of shell and grooving for rotating ring
(1) Shell is held in pot chuck
(2) Facing toolmounted on carriage and operated by power cross feed for facing back end of shell
(3) Hydraulic power operated tool mounted on back of machine for cutting rotating ring groove.

FIG. 5

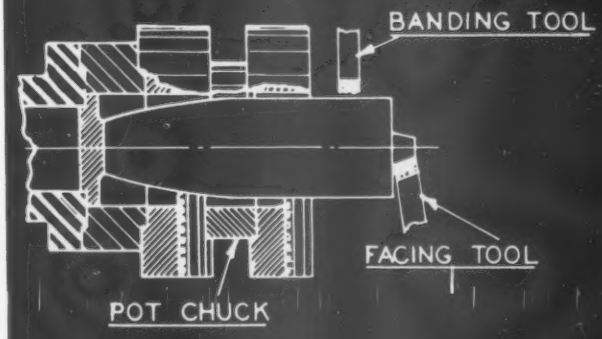
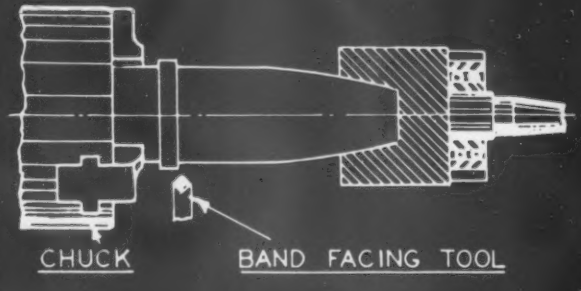


FIGURE VI — Operation — Facing rotating band
(1) Shell is held in hydraulic wedge chuck and female ballbearing center
(2) Single facing tool for facing rotating band
(3) Hydraulic longitudinal feed with power cross feed.

FIG. 6



Defense

Precision DISC Grinding

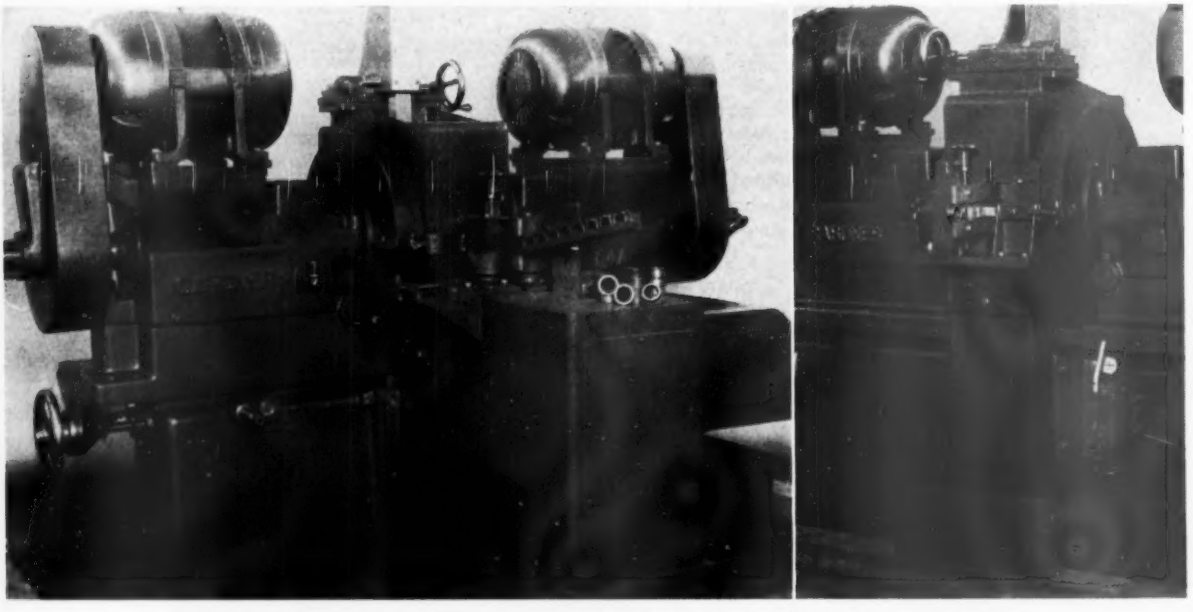
Presenting a picture analysis of some practical applications of the modern disc grinder.

Photos Courtesy Gardner Machine Company and Charles H. Besly and Company

The essential thesis of mass production lies in reducing the fabrication of a product to a large number of simple operations, and then performing each one in its proper sequence with the utmost precision and rapidity.

On this and the following pages one type of machine tool, which performs a limited type of operation, is presented. You will see what great progress has been made towards greater precision and higher speed. You will see how Tool Engineers in plants where these tools are employed have combined their talents with the men who designed the machines to produce ingenious variations of a basic tool—the grinding disc.

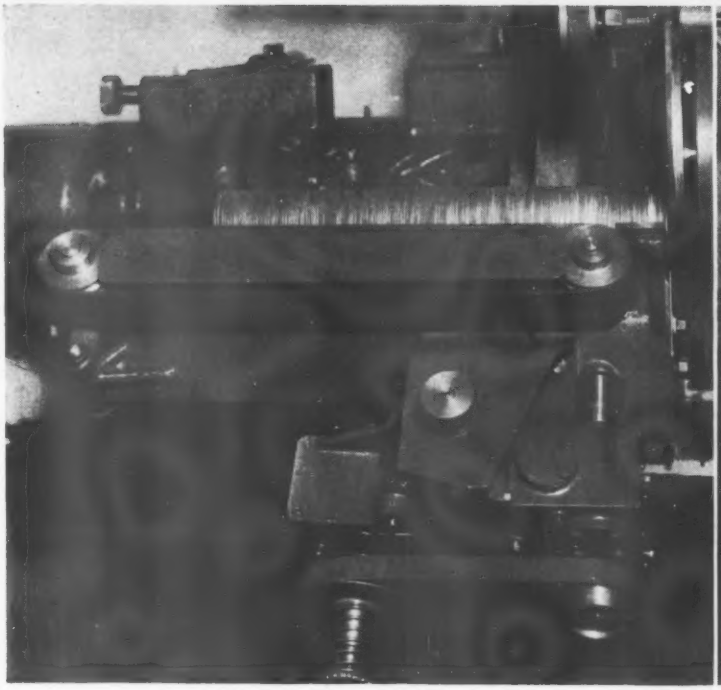
Each of these machines was especially designed to perform a particular operation and to fill a definite need. Each of them is now in operation somewhere in America, doing that job interminably, and producing parts at an astronomical rate.

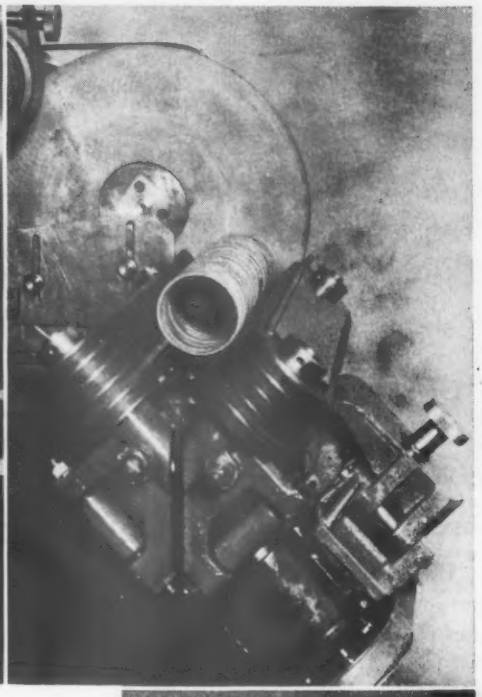


DOUBLE SPINDLE UNIT GRINDS TAPERED BEARING CONES

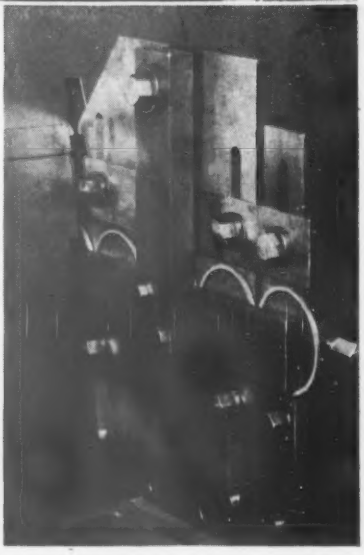
This grinder is a double spindle unit used for grinding the sides of cones for tapered roller bearings. This tool weighs about 15,000 pounds. The tapered bearing cones are supported during grinding on two steel guide bars which extend clear through the machine, and the feeder sends them through between the opposed grinding members in a constant stream. They drop out at the rear by gravity.

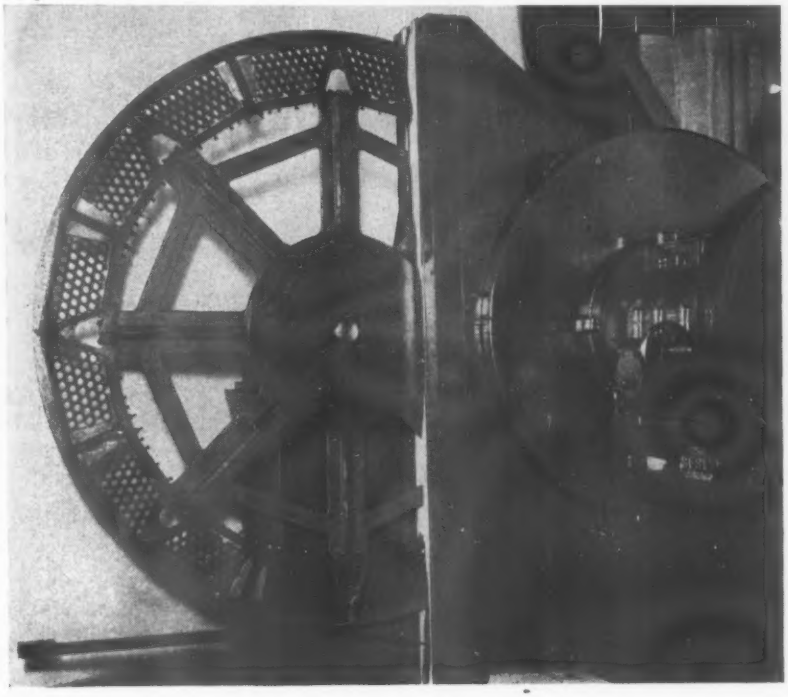
Grinding cones measuring approximately three inches in diameter remove .010 inches of stock over all at a rate of from sixty to seventy-five a minute. Tolerances are maintained three to five "tenths" (ten thousandths) for parallelism and .004 inches for uniformity.



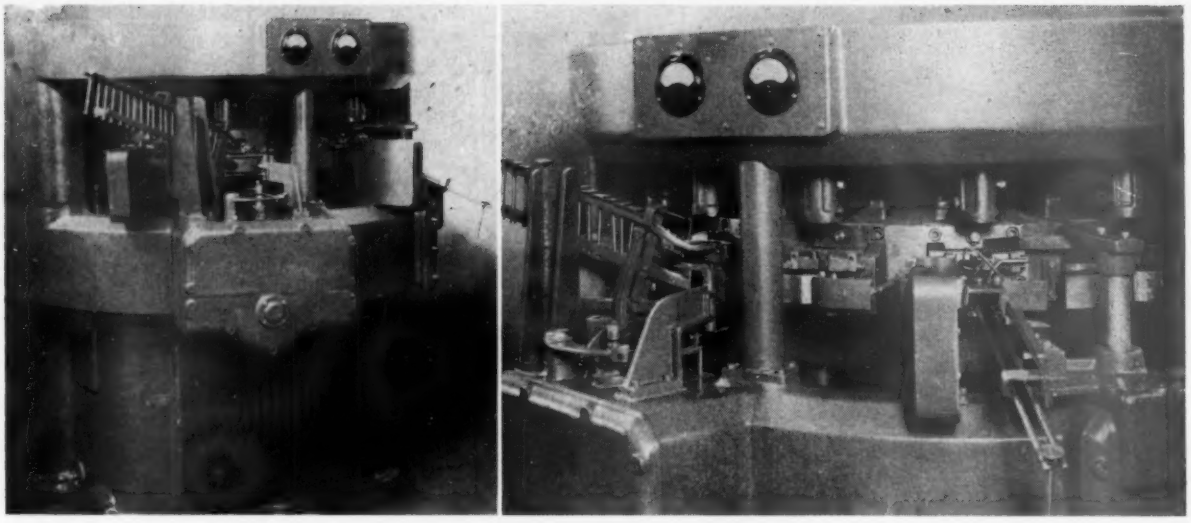


Illustrated above is an ingenious innovation for feeding piston ring castings. The grinder is a double spindle machine which grinds the two sides of piston ring castings. Piston rings are placed in a trough and from there fed into the machine. A problem arises in finding a way to load this trough without interruption of the feeding. As can be seen this was done by constructing the trough of moving Vee belts. There need be no weight or cross head to force rings into the machine, the pull of the belts does that. The operator can fill the trough without interrupting the flow of work. Right: Ground rings emerging from the back of the machine. Production may be varied from 150 to 450 rings per minute.





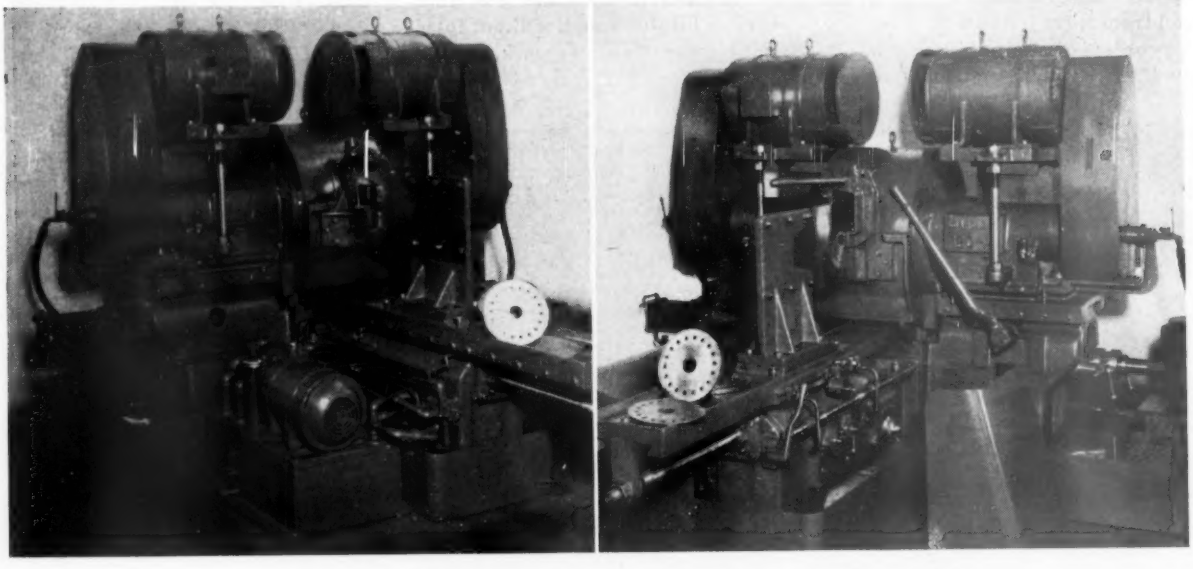
Long ago the operators of carnivals discovered that a ferris wheel could be held steady by the use of a cable drive running around the periphery. On the grinder at left a ferris wheel drive is used to prevent vibration of the 108 in. feed wheel which supplies 2500 automotive valve springs per hour. In variations of this type of machine the feed wheel is horizontal, which simplifies loading.



SINGLE PURPOSE GRINDER FOR VALVE STEMS

A grinder of this type may be described as single purpose for it could not be economically adapted for uses other than that for which it was built. This tool finish-grinds the stem end of automobile valves at a rate of 30 to 35 per minute. There are two grinding heads each 18 inches in diameter operating in the horizontal plane. Valves are carried over the cutting discs by a rotary carrier. Loading and unloading are automatic from chute type holders.

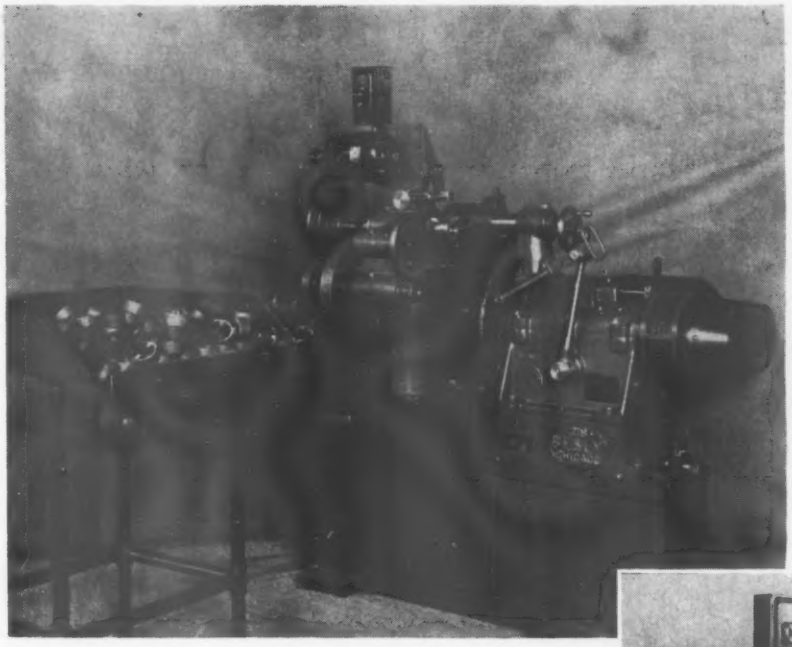
The first wheel roughs off the surface, removing .004 to .005 inches of stock, while the finishing wheel removes .001 inches. The accuracy attained in this instance amounts to three "tenths" for squareness with stem and seat, and plus or minus 7.5 "tenths" for uniformity of length.



EIGHTY SPRING STEEL CLUTCH DISCS PER HOUR

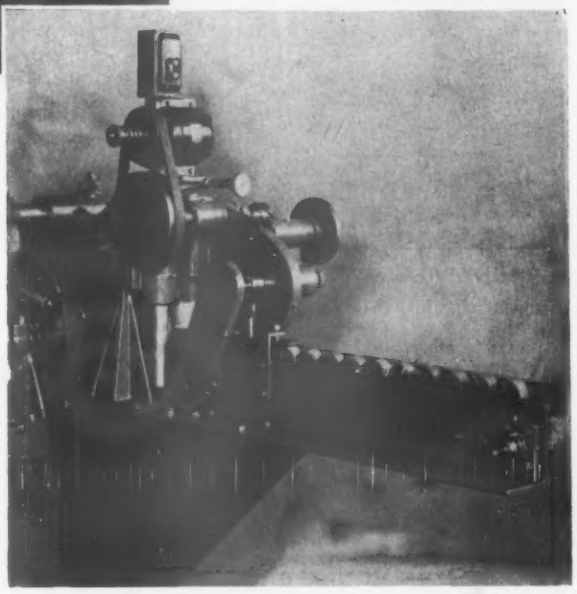
An entirely different type of situation is illustrated here, in which a double spindle grinder handles spring steel clutch discs. These discs are held in a blade type fixture which oscillates automatically while the grinding heads close in hydraulically. The part is held loosely in the fixture and spins during the grinding operation. The grinding takes place under a continuous flow of coolant.

Discs are ground at the rate of 70 to 80 per hour and are held within .001 inches for parallelism, and .003 inches for uniformity.



BELT PROVIDES CONTINUOUS FEED

A variation of the Vee belt trough feed used on piston rings is employed on this grinder for handling shock absorber castings. A single wide belt supplies the pull to keep the castings constantly feeding into the machine. They are loaded onto the belt from a convenient table. The illustration below shows the back side of the feed line with table removed. Grinding is done with two 20 inch discs, and production ranges from 1500 to 1800 pieces per hour.

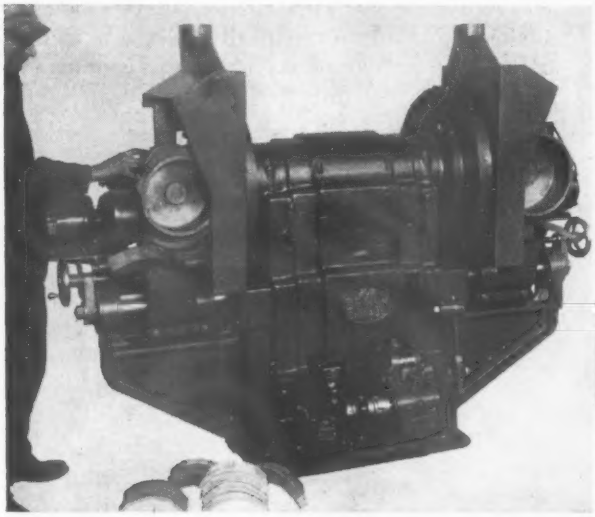


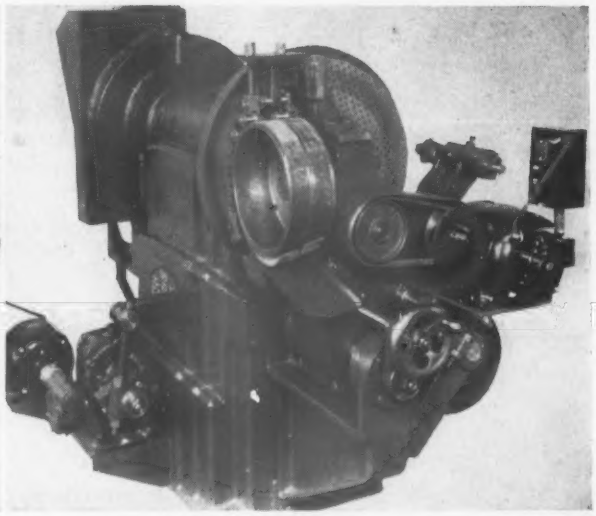
DESIGN SHOWS VERSATILITY

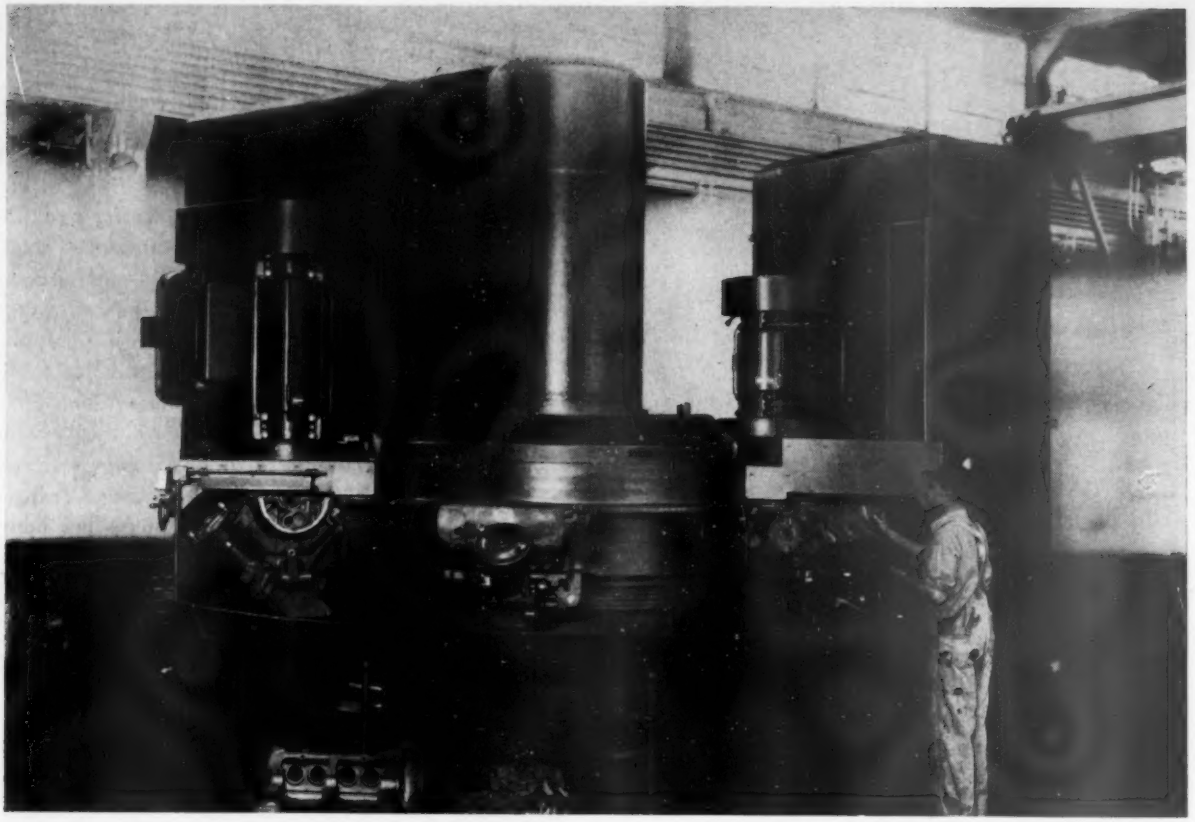
Another example of the versatility shown by engineers in designing these tools is the grinder illustrated below. It is equipped with power oscillated tables and special fixtures for grinding brake linings.

The brake linings are stacked on rotating drums as shown below left. Lugs on the drums pick off one piece at a time and carry it past the grinding disc. The oscillating feature keeps the grinding members true. A close up view of the drum is shown below right.

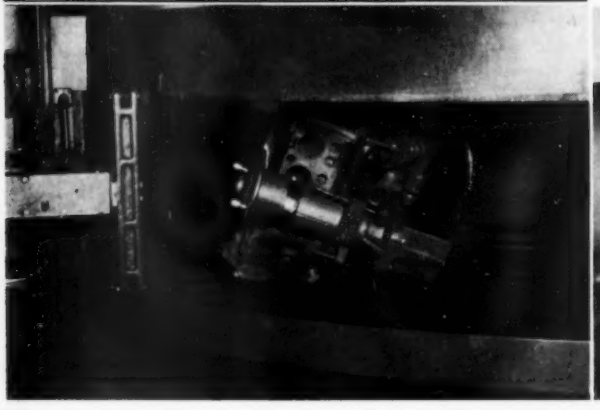
All of these grinders were especially designed for various types of precision work. For an example of a grinder which was designed for an entirely different type of work, turn to the next page.

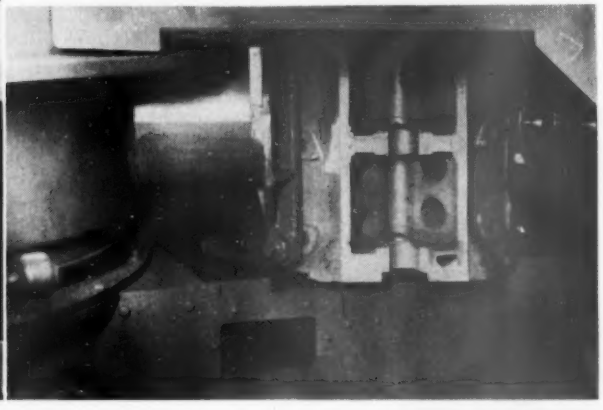


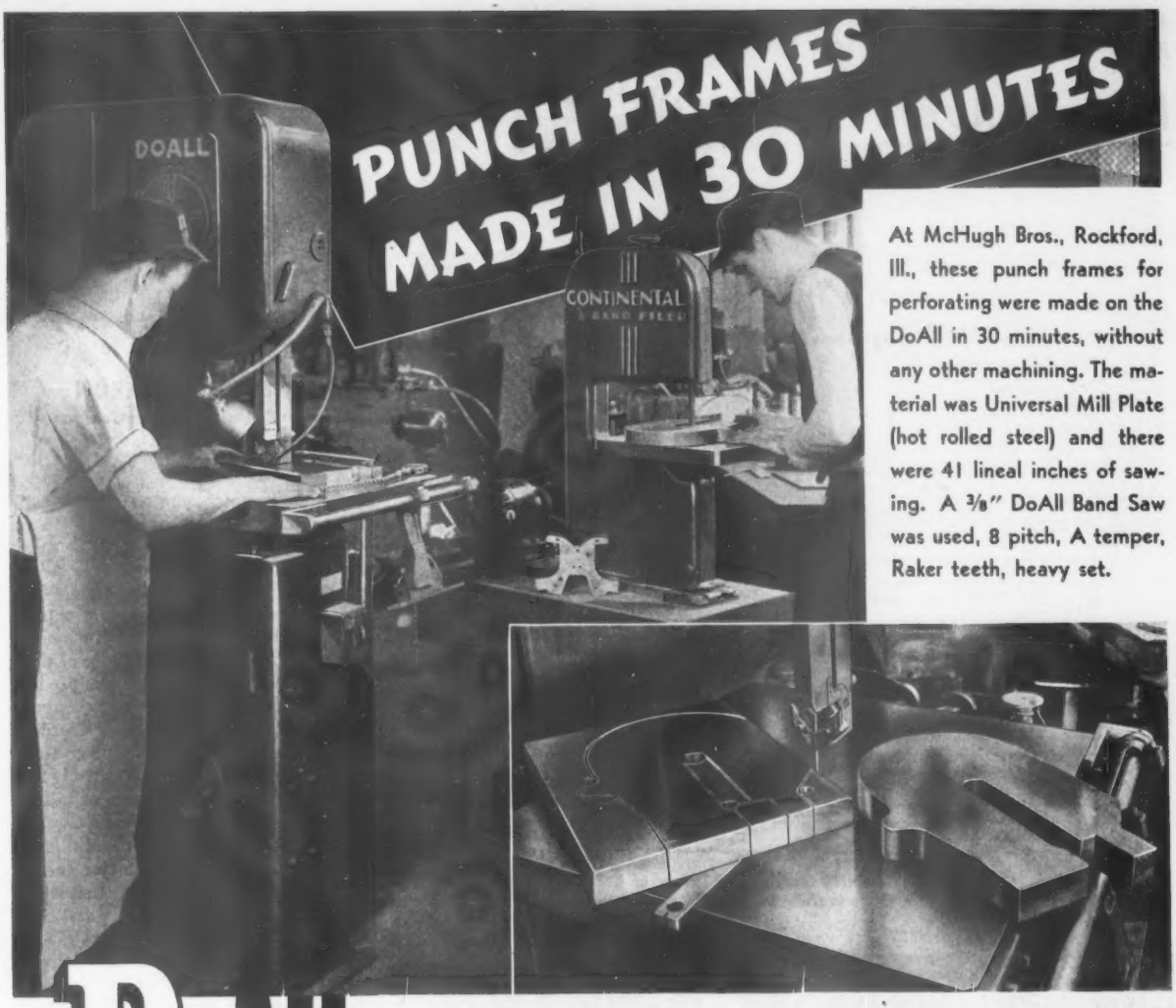




Totally different from the machines shown in the foregoing pages, this grinder is used for rough snagging work. Weighing nearly 35 tons, this machine carries four grinding wheels. Two are on the left hand column, mounted in line, for snagging the bottom surfaces of V-8 cylinder blocks; and two on the right hand column, one above the other, for snagging both ends simultaneously. A rotary carrier with six work stations, each carrying a quick-acting clamp, is employed. The block, bottom surface up, is carried beneath the first two wheels (one taking a roughing cut, and the other a lighter finishing cut) as indicated at left. It is then automatically indexed (below left) 90 degrees for the end grind. Following this operation (below right) it is automatically indexed to its original position for unloading. With three operators the grinder will handle five blocks per minute.







PUNCH FRAMES MADE IN 30 MINUTES

At McHugh Bros., Rockford, Ill., these punch frames for perforating were made on the DoAll in 30 minutes, without any other machining. The material was Universal Mill Plate (hot rolled steel) and there were 41 lineal inches of sawing. A 3/8" DoAll Band Saw was used, 8 pitch, A temper, Raker teeth, heavy set.

DoAll ELIMINATES "BOTTLE NECKS"

In America's "full speed ahead" defense program, the DoAll is playing a major role in cutting corners and factory red-tape. It is the modern machine tool that does precision band sawing, and is replacing shaping, milling and lathe work with sensational savings of time, labor and material. A day's work in one hour—a two hour's job in 15 minutes—these are now common experiences among DoAll users in metal working plants, machine shops, automotive and aeroplane plants, arsenals and shipyards, etc.

CONTINENTAL BAND FILER (shown at the right in picture)—Does continuous band filing, which means faster, better, smoother filing on all materials from tough high-carbon steel to brass, wood, etc. 12 styles of file bands are available, 1/2", 3/8", 1/4" wide, flat, oval or half round.

Let us send a factory trained man to your plant to show you what a DoAll can save for you.

FREE—Literature or Handbook on Contour Machining, 158 pages of valuable metal working helps.

CONTINENTAL MACHINES, INC.

1304 S. Washington Ave., Minneapolis, Minn.

Gives instant variable speed. An important part of every DoAll Machine, also sold separately for use on any other machines requiring variable speed—6 to 1 ratio.

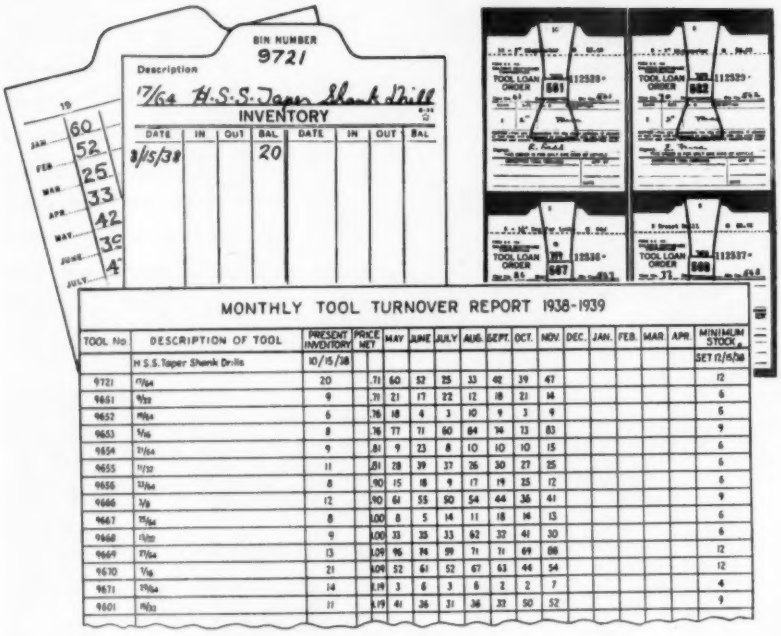
DoAll GRINDER

A super precision surface grinder—a real production tool. Less vibration because motor is built right on the ball-bearing spindle. Work table has exceptionally large bearing surface. Hydraulic table travel is infinitely variable, up to 50 f.p.m.

An adequate tool crib control system will prevent serious delays in tool service

How to Avoid Tool Shortage

by DAVID CAMERON
The McCaskey Register Company
Alliance, Ohio



BIN NUMBER 9721

Description 17/64 H.S.S. Taper Shank Drill

INVENTORY

DATE	IN	OUT	BAL	DATE	IN	OUT	BAL
3/15/38			20				

JAN.	60
FEB.	52
MAR.	25
APR.	33
MAY	42
JUNE	39
JULY	47

TOOL LOAN ORDER 661 112328 — 662 112329 — 667 112330 — 668 112327

MONTHLY TOOL TURNOVER REPORT 1938-1939

TOOL No.	DESCRIPTION OF TOOL	PRESENT INVENTORY	PRICE NET	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MINIMUM STOCK
	H.S.S. Taper Shank Drills	10/15/38														SET 11/15/38
9721	17/64	20	.71	60	52	25	33	42	39	47						12
9651	9/32	9	.71	21	17	22	12	18	21	14						6
9652	19/64	6	.76	18	4	3	10	9	3	9						6
9653	5/16	8	.76	77	71	60	64	74	73	83						9
9654	21/64	9	.81	9	23	8	10	10	10	15						6
9655	11/32	11	.81	28	39	37	26	30	27	25						6
9656	23/64	8	.90	15	18	9	17	19	25	12						6
9666	3/8	12	.90	61	55	50	54	44	36	41						9
9667	25/64	8	1.00	8	5	14	11	18	14	13						6
9668	13/32	9	1.00	33	35	33	62	32	41	30						6
9669	27/64	13	1.09	96	74	59	71	71	69	88						12
9670	7/16	21	1.09	52	61	52	67	63	44	54						12
9671	29/64	14	1.19	3	6	3	6	2	2	7						4
9601	15/32	11	1.19	41	36	31	36	32	50	52						9

Inventory and Activity Cards, and Turnover Report
Gone is the guesswork.

Crib Control in Use
It doesn't shorten delivery period, does assure maximum use.

TOOL service may become a serious production bottleneck in many plants because of the failure of their tool crib systems to meet present production demands. Many small tools ordinarily available from stock already are difficult to secure. Excessive breakage is resulting from the inexperience of new operators and the carelessness of others. Production frequently is delayed while men and machines wait for mislaid tools. Systems considered adequate for former operating conditions are responsible for numerous production losses, that can easily be prevented.

No system will shorten the delivery period required by tool manufacturers, but the maximum usage of all the tools available in a shop or a plant can be assured. It has been customary in many organizations for workmen to retain favorite tools, even though they are used infrequently. In others, tools are left on machines or benches, more or less permanently. One otherwise efficient organization recently adopted improved tool crib methods and found that they had several times the tools necessary for their requirements, when those not in actual use were returned to the cribs.

Modern control provides a record of the tools in the possession of each employee, when each tool was issued and its location. With this information it is not difficult to keep tools in circulation, to be certain that every tool not in use will be immediately available when there is a call for it. They should and will be in the crib and not in some employee's tool box.

In most plants, tool cribs are stocked and replacement orders based entirely on estimates of the quantities needed for production. However sound the estimates may be, the natural tendency is to play safe. As a result, the inventories of nine

out of ten cribs are from 30 to 50% greater than necessary. This is particularly undesirable when the delivery of many tools is extremely slow. The monthly turnover or usage of each tool item is a much more accurate basis.

Recent experiences in several representative plants using a Tool Crib Control illustrate how tool service actually can be improved with a much smaller inventory than originally was considered necessary. One reports that faster service is provided with half the tools formerly carried for the same volume of production. The Tool Engineer in an eastern aviation plant, where employment recently has increased from a few hundred to several thousand states that breakage and loss have been held at a surprisingly low level during the period of hectic expansion. A Michigan manufacturer of screw machine parts and brass forgings is saving hundreds of hours a week for set-up men, machine operators and crib attendants, according to the Tool Supervisor, who adds that their monthly turnover record removes all guess-work from tool ordering and that their inventory has been substantially reduced.

Handling Tool Orders

This control is provided through the three-way distribution of a tool order for each tool loaned to an employee. The first copy indicates what tools have been issued to each employee. The second is the employee's record of the tools for which he is responsible. The third copy gives the location of every tool that has been issued.

The three copies of the tool order are made at one writing with carbon-backed forms; they are white, yellow and pink in color for quick identification. The first and third or white and pink copies are cross-filed in equipment specially designed to secure maximum speed in their handling. This speed of operation obviously is essential to the success of the entire system. In one portion of the equipment a clip spring filing position is provided for each man drawing tools, identified by his payroll or clock number. In another, a similar position is provided for each tool item in its various sizes. Slip holders are placed on all machines and work benches for the employees' yellow copies.

Tools are issued in less time than it takes to describe the procedure. The employee writes out an order for each tool drawn. He is given the tool and the yellow copy of each order with no appreciable loss of his time or the production of the machine for which the tools are intended.

The original or white copy is filed at once under his clock number. This provides a record, instantly available at any time, consisting of signed receipts for each tool drawn. The speed with which

they may be checked or men cleared is obvious. There can be disputes about incorrect postings or misplaced or missing checks. No one questions the accuracy of his signed orders.

The date on the order enables the crib attendant to identify employees who accumulate more tools than they actually need. Procedure for enforcing the prompt return of tools not in use is obvious. How this increases the availability of tools is equally apparent.

The triplicate or pink copy of the order is filed in the tool section according to the item drawn. For example, slips representing two inch and three inch micrometers would be filed under Nos. 561 and 562. These records show at a glance what men have each of the mikes and how long they have been out. The superintendent of a large plant recently mentioned to the writer that it frequently has been necessary recently to open the tool boxes of a score of men to find a few tools needed for a second or third shift. They would have been located in a few moments with this information.

Tools Kept Sharp

The return of tools takes only a few seconds. The employee presents his tools with the corresponding yellow slips. The crib attendant lays them aside and turns to the employees' file. He removes the white copy for each tool and hands them to the employee who destroys them with assurance that his responsibility has been cleared. Each set of tool orders is numbered serially so that it is unnecessary to read the entire slip; the white copy is identified by the number of the yellow one. Contrast the speed of this operation with conventional systems that require a trip to each of the bins from which the tools were withdrawn.

There is another advantage here that is not immediately apparent. The crib attendant ordinarily places returned tools in the bins, when he goes to them for the employees' checks. This provides little or no opportunity to determine whether the tools need sharpening or other reconditioning, particularly if several men are waiting for service at the crib window. When modern control is in use, tools are laid aside with the identifying yellow slips until all of the men at the window have been served. They are then examined thoroughly and only those in good condition are returned to the bins. The others are reconditioned before they can be made available for use. Obviously, this has the effect of cutting down the production of parts that must be reworked or scrapped. Since maximum production is based on the use of sharp tools, it also eliminates loss of production due to faulty tools.

Location Indexed

No system is complete that fails to index the location of all tools whether in the crib or in some overflow storage. Too many plants are dependent on the memory of trusted employees for this important information — frequently, on the memory of one man. Inevitably, this causes delay sooner or later. Production schedules are upset and machines and operators are idle while tools are being located. The modern system provides a visible index that can be consulted in a moment for the location of tools and the names and numbers of employees authorized to draw them.

The inventory of each tool item is recorded on an Inventory and Activity Card. This card is filed permanently in the clip spring filing position allotted to each item. When tools are added to the crib stock the total naturally is increased as shown; when they are scrapped the total is reduced. This is another record, not available in many plants, that is particularly essential under present conditions.

The same card is used in determining and recording the monthly activity or turnover of each tool item. As already stated, the crib attendant immediately gives the white copies of his tool orders to the employee returning tools. The corresponding pink slips provide an additional record. When there is no one at

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TOOL SHORTAGE

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the crib window to be served, they are quickly located by referring to the yellow copies returned with the tools. The latter now have served their final purpose and may be destroyed. The corresponding pink slips are removed from the front of the Inventory and Activity Card and placed back of it. The slips in front of each card now represent tools that are in use; those back of it, tools that have been used and returned during the month.

Once a month, the slips behind each card are counted and the number entered on the back of the card. This provides a record of the activity or turnover of each tool item. A periodical report of this data for all the items in the crib constitutes a factual basis for determining the minimum inventory that must be carried to serve maximum production demands. It is much more reliable than the best possible estimate. As expressed by the tool supervisor in a well-known machine tool plant, it removes all the guesswork and the night-mare from tool ordering and indicates clearly where pressure must be applied, if it is at all necessary.

During more normal times, scores of manufacturers have used this information to eliminate unnecessary tool items and reduce the inventories of others. In some busy plants today, such economies may be less important than the assurance that sufficient tools are available for all production requirements. Even under the pressure of peak production, however, the data is helpful in preventing the accumulation of items that may be purchased simply to play safe.

Keeping Breakage Down

Experience in hundreds of plants has indicated over a period of years that 10 or 15% of the employees drawing tools normally are responsible for 80 to 85% of tool breakage. The employment of untried operators and the carelessness accompanying rush work are resulting in an unusual amount of breakage. It is probable that a larger percentage of employees are presently responsible for it.

The use of a breakage report repeatedly has resulted in reducing these unnecessary losses. The employee who breaks a tool is required to make out a report and secure the approval of his immediate superior before the crib attendant will replace it with a new one. The knowledge that breakage is being checked is sufficient to induce most workmen to handle their tools more carefully. Most users of the system report that breakage is reduced at least 25%, as soon as it is adopted.

Nevertheless, a complete record of the number and value of the tools broken by each employee weekly or more frequently is desirable. It enables supervisors to weed out chronic offenders and to help others who are in need of instruction or assistance. In one plant where the breakage of expensive tools was particularly serious, copies of the original reports were sent to the foreman of each department daily. Substantial reduction resulted, as soon as foremen were in a position to discuss reasons for the breakage soon after it occurred. Additional copies of the report serve numerous purposes. One usually is used to adjust inventory records. Another frequently serves to check the performance of tools that are being tested in some way.

Adaptations of this procedure are used to simplify the issuance of special or numbered tools, blueprints, jigs, fixtures and complete set-ups or kits of tools. Requirements frequently differ in numerous details in several departments in the same plant. The system is sufficiently flexible to meet them without changing its basic principles.

The importance of the tool crib as an essential unit in efficient production frequently is overlooked. If inadequately controlled, tool service may cause numerous unnecessary delays and add materially to production costs; may even become a serious production bottleneck.

TOOTH SPACING *VS* CONCENTRICITY *In Gears*

By MAHLON H. MATCHETT
Le Maire Tool & Manufacturing Co.
Dearborn, Michigan

CONCERNING the manufacture and use of gears, the writer herein wishes to set forth the actual conditions as they exist, and incidentally, correct some of the false understandings that appear to be impressed on the minds of a large proportion of those people who have to do with the manufacture of gears.

First of all, without going back into ancient history, let us start with an understanding of what a modern gear is.

Gears are mechanical means used to transmit rotary motion from one axis to another, in many thousands of different applications. If it were possible to maintain sufficient friction between smooth surfaces, it would only be necessary to use round discs to effect the desired result, but owing to the fact that frictional contact is not practical, it is therefore necessary that some form of "Toothed-and-notched", circularly formed devices be used to overcome the element of slippage; hence the gear.

Concerning the controversial question of how to measure variations in tooth position.

The most practical, and naturally the most commonly used form of same, is the *involute* gear, deriving its name from the fact that the working surfaces or sides of the teeth are of involute form. It is not necessary, at this time, to go into the mathematical explanation of the involute form, other than to say that an involute is nothing more or less than a portion of a "constant-rise cam". Therefore, a gear with 30 involute teeth is nothing more nor less than a circular arrangement of 30 equally spaced involute forms or constant-rise cams, which are really the one side of 30 gear teeth. The opposite sides of the same 30 gear teeth are also 30 similar involutes, arranged in the same manner, only reversed, the material between any pair of these opposed involutes being the gear tooth.

For purposes of calculation only, an imaginary diameter, known as the pitch diameter, and representing the diametral surface of a corresponding smooth disc, (as spoken of above), is used for establishing the spacing of the involutes in such a manner as will permit of the teeth of a mating gear to be engaged therewith.

Now that we have discussed what really constitutes the working surfaces of a gear tooth, we might mention that the linear measurement from some point on one tooth to the same point on the next, measured on the pitch circle is known

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TOOTH SPACING

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as the "circular pitch", and in order to permit of engagement with a mating gear, (as referred to in the preceding paragraph), we must provide spaces between the teeth that will accommodate the teeth of the mating gear in engagement.

In view of this fact, it is the customary practice to make the gear tooth and the space between the teeth each approximately one half of the circular pitch, the space being a few thousandths of an inch wider than the tooth, to take care of various imperfections encountered in the manufacture of gears. This amount of difference between the width of the tooth and the space is called "back-lash", and may be varied as desired, or required.

When a pair of mating gears are mounted in working position so that one transmits rotary motion to the other, it is safe to say that 99.9% of all applications are designed to have more or less back-lash, therefore, it is quite obvious that only one side of the teeth of any gear are being used at a time, because the driving sides of the teeth of the driving gear are contacting or pushing against the opposing or driven sides of the teeth of the driven gear, while between the other sides of the mating gear teeth there exists this small amount of clearance or back-lash, as mentioned above.

By the statement above, we wish to convey to the reader that for a pair of mating gears to deliver pure constant-velocity rotary action, it is absolutely essential that the teeth be positioned around the circumference in such manner that each and every tooth is within very close limits of being in their true circumferential position according to complete circumference of the gear.

It has been inferred by a few people that it is only necessary to hold close limits on the tooth-spacing merely as measured from any one tooth to the next, but with this the writer cannot agree, because this small "tooth-to-tooth" tolerance may accumulate or "pile up" into a sizeable amount in traveling approximately half way around the gear so that it is unfortunately probable in many instances to find gears whereon some teeth are extremely out of position.

Let us take, for example, a 30 tooth gear, that has an established limit of plus or minus .0004" (four tenths) for tooth-to-tooth spacing. It is possible, and in many cases it does happen, that this .0004" limit may read consistently plus, for a distance approximately half way around the gear, so that in traveling from No. 1 tooth to No. 15 tooth, this small amount has accumulated to 15 times .0004" or .006 (six thousandths), meaning that No. 15 tooth is .006" out of position with relation to the starting position.

Now, if such a gear were used, it can be readily seen that it will transmit to its mating gear an alternately accelerated and decelerated, or galloping rotary motion, of .006" in every revolution which, when rotated at say 2000 to 3000 R.P.M., presents a very unsatisfactory performance.

The writer in no way means to minimize the importance of tooth-to-tooth spacing, but instead wishes to emphasize the point that entire circumferential spacing is actually much more important in the making of really good gears.

Errors in tooth-to-tooth spacing, in many instances, may be somewhat improved by proper lapping, but lapping has no appreciable corrective effect on circumferential spacing.

The sole purpose of the statements is to point out the facts that it is the sides of a gear tooth only, and only one side at a time that performs the work, therefore, it is of greatest importance that the working sides of all teeth come up their respective working positions in true circumferential sequence with relation to the rotation of the axis.

It appears that the inspection of this important feature in gears, in most shops,

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TOOTH SPACING

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is being drastically neglected or disregarded, and that instead, the manufacturer is depending for a large part on an inspection of concentricity to determin- between so-called "good" and "bad" gears. This circumstance may be partially due to the facts that it is one of the easiest and fastest of inspection operations, and that it has been a "pet" procedure for many years.

Although this concentricity inspection may have some small value, it by no means should be used as a deciding factor in accepting or rejecting gears, as it is just as liable to accept bad gears and reject good gears, as vice versa, with relation to circumferential spacing.

Excepting for some negligible few applications, such as slow-moving indexing devices and the like, there are no instances wherein gears are designed to roll with metal to metal contact on both sides of the teeth at the same time, nor is there any automobile, machine tool, or industrial application wherein power is transmitted in the direction of a line passing through the two axes of a pair of mating gears, therefore, any inspection for concentricity made by rolling a gear in contact with a master gear tied on an indicator must be of little or no consequence in determining whether it is good or bad.

We realize that the gear manufacturer cannot make thousands of gears day in and day out and have them all come within close limits for circumferential spacing, but it is possible to set up an inspection of this particular function, and take steps to control it within closer limits than it has been in the past.

Further, it is impossible to move the teeth after the gear has been cut and hardened, to bring them into proper spacing, but it is possible to hold the gear in such position while finishing the bore, so that these errors in circumferential space are materially compensated for, although the concentricity reading of the gear may be somewhat affected.

In summarizing, the purpose of this discussion has been to bring to light the real importance of circumferential tooth-spacing around the entire gear, as compared to tooth-spacing merely measured comparatively from one tooth to the next, and also, to show that accurate circumferential tooth-spacing should be maintained even to the point of sacrificing so-called concentricity, if necessary.

Shells Roughed Out 19 Times Faster Today

Seventy-five millimeter shells are being roughed out nineteen times faster today than they were during the last war, Fred C. Dull, vice president of the Monarch Machine Tool Co., Sidney, Ohio, told a group of engineers of the International Business Machines Corp. at Endicott, N. Y. recently.

During the last war it took 12 minutes to rough out a 75 m.m. shell, he said. Today the same job is being done in 38 seconds.

Showing how engineering development of machine tools has tremendously speeded up production of defense equipment, Dull said that gears used in defense equipment which were ground at the rate of three pieces per hour in the last war, are now being shaved at the rate of nearly one a minute, and that deep-hole drilling in solid metal which formerly required four hours, is now being done in 15 minutes.

"The machine tool industry has just one big job before it today," Dull said, "and that job is equipping the manufacturers of this country for the production of national defense equipment. All other considerations have long since gone by the boards. Ours is a key industry in national defense—and we are going to fulfill our responsibility."

New Literature

Of Interest to the Tool Engineer

(127) Bore Gages

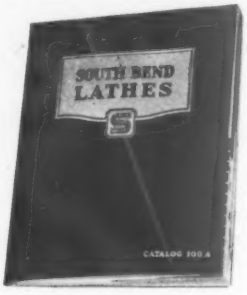
New Speed with Accuracy in Bore Checking. 4 pp. Standard Gage Company, Inc., 80 Parker Avenue, Poughkeepsie, N. Y. A timely bulletin on the improved Dial Bore Gages, illustrated with pictures taken at the Pratt & Whitney Aircraft plant.

(128) Cut-Off Wheels

Norton Cut-Off Wheels. 32 pp. Norton Company, Worcester, Mass. Well illustrated, this booklet recounts the progress which has been made in abrasive cut-off wheels, and describes present wheels and their operation.

(129) Steel Handbook

Handbook of Special Steels. 124 pp. Allegheny Ludlum Steel Corp., Tool Steel Division, Watervliet, N. Y. Information on the properties, uses, and fabricators of Allegheny Ludlum steels which should be helpful in the selection of the proper types.



(130) Lathe Catalog

South Bend Lathes Catalog 100A. 104 pp. South Bend Lathe Works, 928 E. Madison Street, South Bend, Ind. This is said to be one of the most complete general lathe catalogs ever published. Containing over 240 illustrations, it shows 50 different sizes and types of South Bend Back-Geared, Screw Cutting Lathes for manufacturing, tool room, and general shop work. A copy will be mailed on request to any firm or individual who mentions THE TOOL ENGINEER.

HOW TO ORDER

Booklets listed in these pages or information on new equipment may be obtained by using the post card bound in this issue. Merely fill out one coupon for each item desired, being sure to print plainly and to include position and company. Mail the card to us and you will receive the information desired at once.

(131) Machine Tools

Six New Folders. Pratt & Whitney Division Niles - Bement - Pond Company, West Hartford, Conn. Please Note subsidiary key number for each folder:

(131-a) *Deep Hole Drill Sharpener.* 4 pp.
(131-b) *No. ½B - No. 1B Deep Hole Drillers.* 2 pp.
(131-c) *No. 1½ Deep Hole Driller.* 4 pp.
(131-d) *No. ½B - No. 1B Deep Hole Reamers.* 2 pp.
(131-e) *Gun Barrel Chambering Machine No. ½B.* 4 pp.
(131-f) *Gun Barrel Rifling Machines No. ½B - No. 1B.* 4 pp.

Each circular is of suitable size to fit ring binder, and each contains illustrations, description, and specifications.

(132) Tool Steels

Crucible News, Winter 1940. 32 pp. Crucible Steel Company of America, 405 Lexington Ave., New York. This issue contains interesting stories on the appli-

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When you have a screw driving job APEX has a POWER BIT for it

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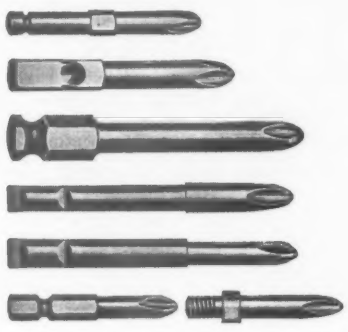

For Phillips Screws

Four sizes of APEX-Phillips Power Bits drive the entire range of Phillips wood screws, machine screws, sheet metal screws and stove bolts. They are available for nearly all makes of electric, air and spiral drivers, in two grades—General Purpose for the standard screw, and Super Service for case-hardened, self-tapping screws.

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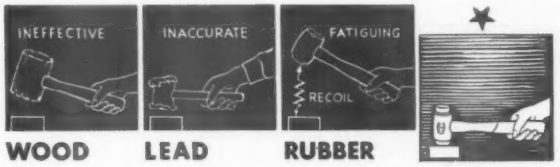

WOOD *makes a clumsy tool that will split and crack.*

LEAD *metal heads have edges that turn, break and fly off.*

RUBBER *makes a bouncing head that chips and smears.*

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NEW LITERATURE

(Continued from preceding page)

cations and use of Tool, Alloy, Stainless and other Specialty Steels.

(133) Cutting Tools

Instructions for Using Carboloy Standard Tools. 12 pp. Carboloy Company, Inc., 11145 E. 8 Mile Blvd., Detroit, Mich. A pocket size manual of instructions for using the new Carboloy Standard Tool line.

(134) Machining

Ampco Metal Machining Information. Engineering Data Sheets 47 & 48. 4 pp. Ampco Metal, Inc., Dept. TE-2, Milwaukee, Wis. Information showing correct methods for drilling, reaming, tapping, milling, and grinding this aluminum bronze alloy.

(135) Gear Booklet

Bulletin Number 270. 44 pp. Michigan Tool Company, 7171 E. McNichols, Detroit. A wide variety of tables and formulae, with actual examples for calculation illustrating new methods. Of value to the shop executive and engineer.

(136) Sheet Metal

Niagara Machines & Tools for Sheet Metal Shops. 24 pp. Niagara Machine and Tool Works, 637-97 Northland Avenue, Buffalo, N. Y. A handy, pocket-size catalogue.

(137) Hydraulic Cylinders

Tomkins-Johnson Hydraulic Cylinders. 24 pp. The Tomkins-Johnson Co., 624 N. Mechanic Street, Jackson, Michigan. This catalog is said to include information on the Hydraulic Cylinders which has not previously been included in books of this kind.

(138) Live Centers

The Sturdimatic Live Center. 4 pp. Sturdimatic Tool Company, 5218 Third Avenue, Detroit. Illustrations, sketches, description, prices of this heavy duty live center.

(139) Hydraulic Equipment

Barnes Power & Control Panel and *Barnes Index Power and Control Panel.* 2 pp. each. John S. Barnes Corporation, Rockford, Ill. These pamphlets are the latest two of a series which will give data on the design and application of Barnes products.

(140) Speed Control

How to Speed Up Production with Variable Speed Control. 24 pp. Reeves Pulley Company, Columbus, Ind. This booklet cites 36 specific examples in all types of industrial plants in which speed control made possible definite production increases and advantages. *Reeves Speed Control for Machine Tools.* 8 pp. Explanation of the various types of units and typical installations.

(141) Electric Tools

Portable Electric Tools. 1941 Catalogue. 60 pp. Black & Decker Mfg. Company, Towson, Md. Fully illustrates and describes the complete line of 132 portable electric tools, many of which are said to be entirely new.

(142) Ball Bearings

Sealmaster Ball Bearing Catalogue No. 840. 32 pp. Stephens-Adamson Manufacturing Company, Aurora, Ill. A well organized presentation of data on the Sealmaster bearing line.

(143) Slide Rules

How to Choose a Slide Rule by Don Herold. 24 pp. Keuffel & Esser Co., Hoboken, N. J. Although intended for engineering college students, this booklet will be of value to anyone who uses a slide rule—not only for the information included but for the writing of Don Herold.

(144) Electric Tools

It Sands, Saws, Hones, Files. 4 pp. H and H Research Co., 12540 12th Street, Detroit. Description of two Junior and four Senior models of reciprocating Multi-purpose tools.

Handy Andy Says—

BELATEDLY, I want to congratulate the author of the fine editorial—"America in the Making"—in the December TOOL ENGINEER. I should have done that in the previous issue, but it happened that I had actually mailed in copy for January before the December number came to hand. Anyway, the author is to be commended for a fine piece of promotional writing; it is an inspiration to the engineers "who tool the nation". And it is true, as the editorial implies, that the engineers and scientists of America (of the world, for that matter) are crashing new industrial frontiers, and that as a result of this and the genius of Tool Engineers in tooling for mass manufacture, we enjoy an unprecedented material progress.

One can also agree with the implications of the editorial, (but with reservations) that the whole bears the stamp of youth and youthful enthusiasm; that what we have is the result of projecting ahead, not looking backward. But what, in the final analysis, is youth, except a matter of mind? Youth, without experience, blunders to an end, achieves success on the debris of mistakes. The oldster, possessed of unlimited experience, may stay in a rut for life unless endowed with enthusiasm, the youthful outlook. But, the man of matured years, endowed with inventive genius, enthusiasm and experience—ah, there is the wide horizon! It is a combination of these qualities, with vision and faith, that enabled the founders of the A. S. T. E. (men somewhat greying at the temples by now) to project this Society to a dynamic force in the industrial and engineering world.

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Despite all of our material progress, however, I wonder if we are not wavering on the brink of a social and economic recession, to use that term? For certainly, at no time in American history, have our social and economic systems been so sharply challenged as at the present time. Of late, we have been subjected to the impingement of foreign Isms, with their undeniable impress on the consciousness of the masses; we have been made the guinea pigs in a series of social and economic experiments which, in the guise of reform, have nevertheless weakened our national fibre. And, living in a synthetic age, we have been so weaned from the rough if substantial fare of our fathers that we have had to be pepped up with artificial hormones and vitamins. We are getting away from fundamentals. Perhaps, now, we need a national crisis to jolt us back into a sense of values, may even need the crucible of war to eliminate the dross. For certainly the basic elements that, combined, fused America into a great and progressive nation are still there. And it is those basic elements that we want to preserve.

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Now, I am not one to pine for the "good old days", old to the youngster who never had to hand crank a recalcitrant engine but fresh in the mind of my contemporaries who hailed the first self-starter. And that wasn't so long ago—in fact, the inventor is still "there" and just young enough to keep on improving our design for living. Those of us who lived in those recent "old days" didn't like them so well, and we did our demndest to change them. Perhaps we effected change too fast; who knows? But consider that in the brief span of our time there has been effected changes in the habits and living standards of the masses that are truly revolutionary in their scope. When we came on the scene, the telephone and the talking machine were still modern wonders, if crude. We have witnessed the evolution

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HANDY ANDY SAYS

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of the horseless carriage, wireless and flight, and we have helped to streamline them, to tool them for mass manufacture, even as we now tool the machinery of defense. Oh yes, we're smart, very smart, in the engineering of material things. But so far, we have failed in human engineering, and the sooner we turn our thoughts to this chore the better for the future of America. For, of two forces of discontent —the constructive and the destructive—it is better that the first prevail. Needless to say, Tool Engineers stand for construction.

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Now, I am not against reform, but I would see reform based on a workable premise. The combination of high wages and short hours is a sane and progressive reform, because it presumes economic independence and the leisure in which to enjoy it. This, of course, is contrary to the preachments of the mossbacks of yesteryear, who held that any shortening of the (then) 14 hour day would be "bad for the morals of the working class". Bunk! The greatest immorality of all is the bondage engendered of apathy and misery, because it stifles mass progress. But, in subscribing to collectivism, the masses have put themselves in a bondage just as onerous, because now we have a deadly levelling, and, practically, a legislated class division which is just as baneful as the slavery prior to '61. The difference is that then the slave could buy himself free, now the freeman buys himself into bondage. And that's about the same kind of progress that Old "Muss" is having in Greece and Africa.

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We hear, from the wiseacres, that America must eventually succumb to collectivism if we are to compete in the economic scheme now being set up by the dictators of Europe. Even England, these brain trusters say, cannot escape a social and economic revolution; the day of wealth and aristocracy is gone and from now on labor will sit in the saddle. Well, I'm not adverse to that, provided that labor first learns to control itself and is not controlled by racketeers. And fortunately, there is a marked trend toward conservatism. Yet it is significant (I repeat myself here, to stress a point) that not one labor government in Europe has been able to stand up under the assaults of the authoritarians, that even England was imperilled by its own labor until labor and the conservatives learned to pull together. And there is no direct evidence, as yet, that labor reforms in America have effected the major benefit promised, which was to spread employment and decrease relief. True, there is increased employment now, but that is due to national emergency, not to planned reform.

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As for hormones and vitamins, I'm for them. Living in an artificial age, one must resort to artificiality to be natural. Now, now, Bre'r A. S. T. Eer, I know just what you're thinking—I can read your mind like an open book. But we'll save that for the big meeting in March, when the boys who "tool the nation" will meet, greet, eat and (maybe) treat at the big Tool Show the Society is about to spring on an expectant technical world. So, I'll be seeing you then, hoping that Slim McClellan will have his Hounds baying and that Connie Hersam will have Rally Sand or some other artiste on tap for the Scotties. So, stock up on hormones to pep up your dogs, because there's going to be plenty of tired ones before the Show ends. It's headline stuff, you know.

Yours for Tool Progress,
Handy Andy.

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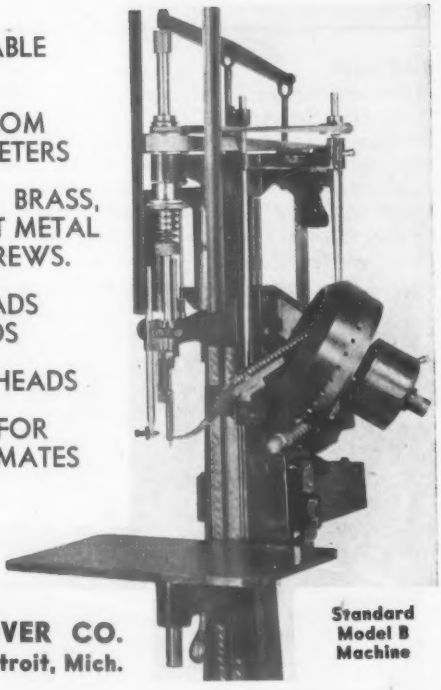

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» » A. S. T. E. DOINGS « «

By IRWIN F. HOLLAND

Baltimore

The first meeting of 1941 was held on Wednesday, January 8. There were approximately 75 members at the dinner and meeting. Our friends from Washington were again present. At the short business meeting a committee for the election of the 1941 officers was selected. At the next meeting in February the new officers will be elected. The speaker for the evening was Mr. Malcolm F. Judkins, chief engineer for the Firthite Division; Firth-Sterling Steel Co., who gave a talk on "Sintered Carbide Tipped Tools and Their Application to Metal Cutting." Mr. Judkins illustrated his fine talk with a movie showing the various phases of manufacture and applications of the tools to the metal cutting industry.

The chapter is going to vote on a new meeting place for the fall sessions—The Engineers Club of Baltimore. This is a very professional club which has a fine dining room, game rooms and a good library with all the latest technical books and data. All this will be available to Chapter No. 13 if the motion is swung in favor of the new meeting place. The Chapter wishes to extend to all the other chapters its sincerest wishes for a very happy and prosperous new year.

Boston

The January meeting of the Boston Chapter was a splendid success in spite of the fact that a goodly number of our regular members were laid up with attacks of grippe. Seventy-one members and guests attended the dinner and 120 were in attendance at the technical session at Massachusetts Institute of Technology.

The meeting was turned over to "Locky" Lockwood our Vice Chairman who introduced Mr. Joseph H. Pasell, Design Engineer of Morse Twist Drill & Machine Co. (charter member of the Boston Chapter) who presented a talk on the subject of "Government in the Bee-hive." Mr. Pasell's talk was splendidly delivered and convinced each of us that Bees are adepts in the finer arts of engineering.

Our guest speaker for the evening needed no introduction but Mr. Lockwood in his customary polite manner called upon our Chapter Member and Chairman of the Standards Committee, Mr. Anthony J. Snyder, Director Physical Laboratory, Morse Twist Drill and Machine Company. His subject was "The Proper Selection and Use of Tools". With the aid of a Delineascope, Mr. Snyder projected drills, taps, and cutters on the screen and gave recommendations for their proper use.

Mr. Snyder's comments on each tool as shown with the aid of the Delineascope proved of interest and value to all present. A rising vote of thanks was tendered to both Mr. Snyder and to Mr. Pasell and the meeting adjourned at 10:15 P. M.

Buffalo-Niagara Frontier

The Buffalo-Niagara Chapter held its meeting on December 19. Mr. O. W. Winter read an article from the Buffalo Evening News about the training of engi-

neers for the Defense Program. It was also announced that an Emergency Defense Committee would be formed.

Mr. Crofoot then introduced the speakers for the evening. The first was Mr. H. T. O'Connor from the Federal Bureau of Investigation. The second speaker on the program was Mr. J. Armour from the U. S. Tool Co. Mr. Armour showed movies and gave a talk on U. S. Multi Millers and Multi Slide machines.

California

California held a closed but well attended meeting at Scully's Cafe on January 9 for the nomination of officers for the coming year.

An exceptionally interesting talk on recent developments in Gear Shaving was given by R. S. Drummond, President of the National Broach & Machine Co., Detroit. Questions and answers prolonged the meeting to a late hour necessitating the postponement of other scheduled matters.

Election of officers will take place on February 13 following the dinner at the usual meeting place. A tool quiz program will be presented by H. F. Lenz of the National Postal Meter Co. This feature, it is hoped, will invoke discussion by the more timid members who are hesitant in expressing their views. It is one of the purposes of our organization to gather and condense this mass of tucked-away information so that industry as well as our members will be able to contribute more to our national defense program.

Cincinnati

The Cincinnati Chapter held its December meeting at the Ohio Mechanics Institute on Tuesday evening, December 10.

After the regular business meeting we were fortunate in having Dr. Ernest J. Abbott, of the Physicists Research Co., deliver a talk entitled, "Surface Finish and the Profilometer", illustrated with lantern slides and a demonstration of the Profilometer.

In the past few years a great deal of interest has been directed to the relation of surface roughness, to the fit, wear, and lubrication of many machine parts. The dimensions of the surface irregularities which determine the roughness are amazingly small on many practical surfaces, the heights of these irregularities are only a few millionths of an inch.

Mr. Abbott pointed out that in modern industry many such problems which involve quantities which are too small or too rapid to measure by ordinary methods, and these problems can often be solved by the application of electron tubes and other modern physics tools. Among the developments of Mr. Abbott's organization is the Profilometer, an instrument for measuring surface roughness.

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(Continued from preceding page)

Cleveland

Playing host to 135 members and guests of the Cleveland Chapter on Friday, January 10, the Weatherhead Company literally "stuffed" them with a delicious turkey dinner.

After the banquet, the members were conducted in groups of ten by competent guides on a tour through the plant. There they saw the raw material as it came from the supplier and passed through the various manufacturing processes until it emerged as a finished product.

When the last group had finished their plant inspection, the members gathered in the spacious cafeteria to hear an address by Lieutenant Dennis of the United States Army Ordnance Department. Lieutenant Dennis provided the members with a brief description as to how the Ordnance Department operates, its function in war time, how the Government cooperates with private industry, and what the Government is doing at present to relieve "bottle-necks" in the production of vital defense material.

This enlightening talk gave the listener a better insight concerning the methods by which the Government seeks to build up large reserves of necessary war materials until private industry is able to step into the picture and fill the gap.

After the festivities, Mr. C. V. Briner, the Chapter Chairman, cordially thanked the Weatherhead Company for the splendid hospitality extended the ASTE members.

Dayton

The Dayton Chapter held its January meeting at the Gibbons Hotel, Monday, January 13, with an exceptionally fine turnout of members and guests.

After partaking of a fine duck dinner the nominating committee was elected to nominate the officers for the coming year. This committee consisted of Messrs. Ziegler, Matthews, and Blair. The meeting was then turned over to the Meeting Chairman, Whitey Poock who introduced a number of new members, and then introduced Mr. Cheever Ely, local representative of the Norton Company, Mr. Fred Hayes, District Manager, Mr. Strong, and Mr. V. H. Ericson, all of the Norton Company of Worcester.

Mr. Ericson, the principal speaker of the evening presented an exceptionally fine and interesting talk on the ultra-finishing of small tools with fine grit wheels. He also showed two separate movies illustrating the manufacture of abrasive wheels and the grinding of various machine tool parts. Slides were then shown by Mr. Ericson of the grinding of different types of cutters, first with the coarser or standard grades of grinding wheels in conventional use and then showed the same cutters after they had been ultra-finished using very fine wheels, removing approximately .001" per pass. The slides were well received as they showed the remarkable finish obtainable with fine grit wheels and proved beyond a questionable doubt that the life of a cutter sharpened in this manner would be much longer than cutters sharpened with the conventional coarser grain wheels. We certainly believe that other Chapters would be interested in hearing Mr. Ericson and seeing these pictures as everyone was given plenty of food for thought on the grinding of tools and cutters.

Detroit

Number One packed 'em tight at the January 16th dinner meeting, when Detroit Transmission Division of General Motors sponsored a talk on the "Hydro-matic Transmission". W. L. Carnegie and O. K. Kelley, respectively, did the speaking, the first giving a history of the job and the latter giving the slide talk. The job was quite thoroughly handled, and truly, it can be said that it was one of the most intensive and purely technical sessions put on for the Detroit Tool Engineers.

Even from a casual viewpoint, it was

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A. S. T. E. DOINGS

(Continued from preceding page)

apparent that the job was a hard nut to crack from start to finish, a credit to the inventors, the product engineers and the engineers who tooled it, not to forget the boys who talked about it. Taken as a whole, it was typical of American technological progress.

Floyd Eaton and Bill Curtis were elected a nominative committee; in their hands rests the new slate. In all, a successful meeting, well attended and well handled.

Greater New York

The greater New York Chapter held its December meeting in the main ballroom of the Hotel Governor Clinton on December 9. Mr. Orchard spoke briefly regarding the membership campaign which was being conducted and stated that it was the aim of this Chapter to secure enough new members by the annual meeting to bring the total up to 300. He stressed the need, however, of keeping up the standard of membership qualifications. He also announced the forthcoming dinner-dance and entertainment to be held on January 24, 1941, and the appointment of Mr. John Hogan as Vice Chairman of the Chapter and Chairman of the Meetings Committee to take the place of Mr. Harold Blye who resigned because of the pressure of other duties.

Mr. Hogan then introduced the speaker of the evening, Colonel Crosby Field of the New York Ordnance District Office of the United States Army. Colonel Field gave a most interesting and informative talk on the subject of "procurement for National Defense", in which he described the organization of the War Department, ordnance district procedure for inspection, procurement, establishing priorities and other details in connection with the work of the Ordnance Department. He also spoke briefly about the various strategic and critical materials which would be needed in time of war. There was a half hour question period after his talk and considerable interest was evidenced by the questions asked.

The drawing for the door prize was won by Mr. Charles Edgar of the Otis Elevator Company.

Hartford

The Hartford Chapter held its regular meeting at the Hotel Garde on January 6. There was the usual fine attendance, there being 140 present for dinner and 200 for the technical session. At the dinner an interesting talk was given by Mr. A. L. DeLeeuw, whose subject was "Mental Attitude in Engineering."

The meeting was then turned over to the meeting chairman, Mr. James N. Skinner, who presided at the technical session and introduced Mr. W. C. DeGraff of the Warner and Swasey Company, who spoke on the subject "Turret Lathe Tooling."

Mr. DeGraff briefly told the history of turret lathes and showed a number of interesting slides on tooling, particularly on national defense jobs. The question period was lively and brought out a number of good discussions.

Milwaukee

The Milwaukee Chapter met December 1 at the Boy's Technical High School in Milwaukee. Mr. Heywood, director of the Boy's Glee Club was introduced and the Glee Club put on a fine entertainment. After the singing, Mr. T. C. Brown, Principal of the Boys Technical High School was introduced and made an address of welcome.

The meeting then adjourned to the auditorium where Mr. Roy Radtke gave a splendid talk on how "Industrial arts contribute to the Defense Program."

Mr. Fred Zuegenhagen then spoke on how "Trade Education contributed in the Defense Program," which was a splendid talk.

After the speeches, a plant visitation was made, taking visitors through the

(Continued on following page)

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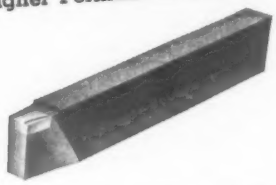

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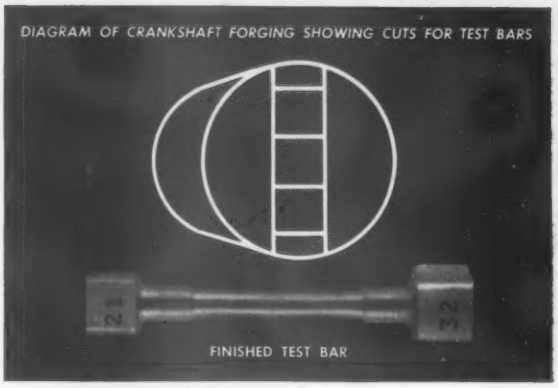

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Aircraft Crankshafts
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A. S. T. E. DOINGS

(Continued from preceding page)

Boy's Technical School Departments. This closed the proceedings for the evening.

New Jersey-New York

The regular January meeting took place on January 14, at the Essex House in Newark, New Jersey. After the usual dinner and a short business session a large audience of members and guests were treated to a talk by Mr. James R. Longwell, Chief Engineer of the Carboloy Company, on "Steel Cutting with Carbide Tools," which was illustrated with many excellent slides. All this and the importance of the subject caused a lengthy discussion during question periods, during which Mr. Longwell imparted a great deal more practical information on Carbide Tools than it is possible to simply remember later on when tackling design or production problems. The courtesy of U. S. Tool Company, of Ampere, New Jersey, provided the showing of a beautiful color film—A Trip Through Florida.

Philadelphia

The regular meeting on January 16 was one of those winter nights with the weather against us but proved to be a most enjoyable night. There was an attendance of 70 at the dinner. During the dinner our past secretary, Edward Glenn, led the singing. Mr. Glenn surprised the chapter by having the main speaker of the evening, Mr. Spencer B. Terry, sing "On the Road to Mandalay" and "God Bless America". The members enjoyed this treat.

Mr. E. LeRoy Mercer, Jr. presented a motion picture film showing Fire Prevention methods, sponsored by the Atlantic Refining Company, for a coffee talk. This instructive talking film was appreciated by all especially by some of the manufacturers who were present.

At the evening meeting there were 96. Mr. Terry, Chief Gage Engineer, Pratt & Whitney Company, Hartford, Conn., spoke on "Modern Gaging Practice." It was a real lecture, illustrated with pictures and exhibits. Also present at the meeting were members of the Tool & Die classes from the Spring Garden Institute which are sponsored by our chapter with instructors picked from our members.

Racine

The Racine Chapter held its meeting on December 9 at Hotel Racine. The Chapter was pleasantly surprised by the presence of Mr. Ford R. Lamb, National Secretary of the A. S. T. E. Upon being introduced by Chairman Zaber, Mr. Lamb brought greetings from the home office in Detroit, and briefly described the activities of the recent Cincinnati meeting. He also announced with enthusiasm the coming convention to be held in March, and he promised that it would be the biggest and best ever.

Mr. Zaber then introduced the speaker of the evening, Mr. L. M. Benkert, Work's Manager of the Progressive Welding Company of Detroit, Michigan. Mr. Benkert, with the aid of lantern slides, made a thorough and practical explanation of the theory of "Spot-Welding", his subject for the evening. He also explained the uses of various equipment for Spot-Welding, and described experimental equipment being developed by his company.

The meeting was adjourned at 9:45 p.m. with a rising vote of thanks to Mr. L. M. Benkert.

Rochester

The American Society for Metals joined with the local Tool Engineers for their January meeting. The seventy-five who sat down to dinner at the University of Rochester not only enjoyed a good meal, but an appropriate talk on the vulnerability of this area from the military point of view. Mr. Paul S. Rice gave the coffee talk and with it showed movies of the local 121st Cavalry unit at home as well as at last summer's war games in the

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Ogdensburg, N. Y. section. Seventy-five per cent of the vital (from the military standpoint) industrial area is covered by an area described by a 500 mile radius centering at Elmira, N. Y., according to Mr. Rice. Were the war games held in Northern New York because of the possible invasion into this area by way of the St. Lawrence River? Mr. Rice left the impression they were.

Adjourning to Lower Strong Auditorium the meeting proper was called to order by Chairman John Dense. Mr. Walter Morton, Chairman of the Steel Treaters gave a short talk before the speaker was introduced.

Mr. W. M. Evarts, Engineer of the E. W. Bliss Company, Brooklyn, talked on the plastic working of metals. Mr. Evarts pointed out that plastic working of metals was nothing new. In fact, coins of over a thousand years ago were definitely a result of plastic working.

Mr. Evarts had an interesting but rather technical talk. Much was said via word and chart covering the theoretical aspects of punch press operations, and we are afraid a fairly large percentage of the 175 odd listeners were disappointed in not hearing more about the practical application of this interesting subject. Mr. Evarts had a very interesting film showing a number of the mechanical as well as hydraulic type presses under operation. To top off the evening he showed a can-making process which gave a comprehensive picture of this important operation.

Rockford

The regular meeting for December 5 was called to order at 6:45 with a dinner attendance of 149 men, members of our Chapter and of the Rockford Navy Club who cooperated in presenting as a dinner speaker, Chief Machinist's Mate Harry P. Warren, who is the local Naval Recruiting Station Head. He was introduced by Mr. Thorsell, head of the Navy Club, who also gave a short talk on the aims of the local club. Entertainment was furnished by the Honolulu Conservatory of Music.

The dinner talk was "Opportunities for Technical Training in the Navy." Mate Warren told how a sailor learns by actual experience the various phases of running a ship. Machinists on board a ship must be capable of making repairs to at least get the boat back to shore in case of emergency. Many interesting questions pertaining to the Navy were answered by Mate Warren, before the recess was called at 8:10, allowing those present to revisit the exhibits in the South Ballroom.

Mr. Earnest Flanders of Jones & Lamson spoke to 250 men on "Thread Grinding." He explained how the "comparator" was devised to study thread elements, form, and lead. The aviation industry was instrumental in bringing out the thread grinder commercially, one that grinds threads of any shape and of high production. Since first coming out there have been big changes in grinding wheels, coolant, and Ball Bearings. The talk was illustrated with slides, and many interesting questions were asked of Mr. Flanders.

In checking the crowd it was noted that 7 men were Navy Club Members. Fourteen men came from Beloit, Wisconsin, representing Besly Grinder Co., and 5 came from Freeport, Illinois, as well as many from Chicago. Leo Reuland, Vice Chairman, was in charge of the meeting, and did a fine job.

Schenectady

The regular monthly meeting of Schenectady Chapter was held Monday evening, January 13, with a dinner attended by over 100 members. At a brief business meeting conducted by Chairman Fred Diehl, Messrs. C. H. Borneman and J. A. Staehle were elected to the nominating committee. N. Y. Coxe was elected secretary of the chapter to fill the unexpired term of D. G. Saurenman who has resigned because of his recent transfer to

A. S. T. E. DOINGS

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the Pacific Coast. Mr. Diehl also announced that Mr. B. G. Tang had been appointed A. S. T. E. representative on the Emergency Defense Training Committee of this district and that Mr. R. E. Ellis had been appointed representative to the Educational Committee of the society.

Mr. Thomas W. LaVenia of the U. S. Secret Service Dept., gave an interesting outline of the history and functions of this law enforcement agency. He also presented a very interesting motion picture depicting the engraving and printing of paper money. His pictures pointed out the many ways in which counterfeit money may be detected by the average person and demonstrated how the public can play an important part in the conviction of persons thus violating the law.

Mr. V. R. Parker of the E. W. Bliss Company showed several reels of pictures illustrating recent developments in the punch press field. Many interesting designs including hydraulic and high speed machines as well as conventional presses were shown in the pictures. Many of these installations included the use of efficient methods of handling work which were of interest, especially to Tool Engineers who are involved in problems of repetitive manufacture.

St. Louis

St. Louis Chapter held its regular meeting Thursday January 9, 1941 at the Melbourne Hotel. In the absence of Chairman D. D. Burnside, the meeting was presided over by Vice-Chairman C. J. Sinning. The high light of the evening was the presence of Executive-Secretary Ford R. Lamb who received a most hearty welcome. After a brief business session the members went in a body to the Engineers Club of St. Louis to take part in a yearly joint meeting. To open this meeting Mr. Ford R. Lamb made an excellent talk on the problem of educating help for defense industries. He was followed by Mr. W. H. Wills, Metallurgist, Allegheny Ludlum Steel Company, who gave a lecture on "The Manufacture of High Speed Steels." The lecture was supplemented by movie and slides. The talk and pictures covered the subject in all its phases, from the raw materials to the finished tools.

Syracuse

The Syracuse Industrial Club was the scene, January 14, of the regular meeting of the Syracuse Chapter. During the business meeting plans for the coming dinner dance were explained by Joe Owens, chairman of the entertainment committee, and Ray Adams reported on the work of the committee in charge of publicity for the Detroit convention and Machine Tool Show.

The speaker of the evening, Mr. V. R. Parker of the E. W. Bliss Company gave a lecture on "Punches and Dies" accompanied by both slides and motion pictures. The slides and lecture were based on the fundamentals of Crane's Book, "The Plastic Working of Metals," while the motion pictures showed many applications of Bliss presses on the job. It was a profitable evening enjoyed by all.

Toledo

The January meeting of the Toledo Chapter held January 14 at the Toledo Yacht Club was acclaimed "The finest meeting to date". The program committee again presented an excellent program conducted as an "Information Please" type of meeting with a Board of Experts billed as the "Wise Men", consisting of Messrs. Haynes, Burgess, Hayes, Burke and Lamabe, with Jim McNutt as interrogator. Questions were asked by the audience on problems dear to all Tool Engineers with a ten minute time limit set to discussions on the question by the "Wise Men". Needless to say, discussion ran over the limit in several instances.

In fact the first question of the evening was one unanswered from the December Quiz Bee program, and one which all five of the "Wise Men" expounded upon, presenting a very satisfactory solution.

The "Wise Men" at times did not quite agree among themselves to the delight of the audience.

Next month still another version of the information type program will be offered with the questioneer and answerer sharing in cash prizes.

Tri-Cities

The Tri-Cities Chapter held its regular monthly meeting on January 8, at the LeClaire Hotel, Moline, with 132 engineers present.

The speaker of the evening was Mr. J. D. Trethaway, Sales Manager of the Cerro de Pasco Copper Corporation. The subject of Mr. Trethaway's address was "Uses and Application of Cerro Matrix, Cerro Base, and Cerro Bend." His talk was illustrated with slides showing many of the applications of these low melting point alloys.

During the meeting, Professor Thomas Caywood of the University of Iowa at Iowa City was introduced and explained to the group the proposed course of instruction to be conducted in the Tri-City area for tool designers and Tool Engineers.

Twin City

The Twin City Chapter met December 18 with the local Chapter of the American Society for Metals in a joint dinner and technical session. The meeting was held at the Coffman Memorial Union of the University of Minnesota. About 80 sat down to dinner and the good old A.S.T.E. had a majority. Numerous others came later for the lecture. Dr. Mario Martellotti of the Research Department of the Cincinnati Milling Machine Company spoke on "Machinability." The lecture was illustrated by colored movies and slides. This was a highly interesting talk and considerable discussion was invoked.

Western Michigan

The Western Michigan Chapter held its regular meeting on Monday, January 9 in the Browning Hotel in Grand Rapids. The meeting, a supper meeting, was attended by 55 members and their guests, Mr. Cloud, program chairman, acted as toastmaster. The main speaker of the evening was Mr. Miller of the New Products Company. Mr. Miller, who is a specialist on die casting, confined his talk to Zinc Die Casting. He brought several sample castings and one die casting die along for personal inspection. Besides discussing the advantages of zinc castings, he gave the cost of each part and the cost of the dies to the purchaser. Several ques-

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tions were raised as to the harm or advantage of copper, aluminum and lead in the metal, also regarding plating and painting of zinc castings.

After the meeting, everyone agreed that Mr. Miller gave a remarkable talk and demonstration on zinc die castings, their dies, and casting machines.

Worcester

The annual meeting of the Worcester Chapter of the A.S.T.E. was held January 13, at Putnam and Thurston's. The meeting was preceded by a dinner at which gifts supplied by various New England plants were distributed to the members attending. During the dinner Art Starrett led the gang in singing "God Bless America." Entertainment was supplied by a White Entertainment Corporation troupe of Boston through the guidance of Al Freede, master of ceremonies. The show opened with a song and dance by the Darling Sisters followed by George Watts, tap dancer. After the troupe performed, Lane, the magician, came on and kept the boys guessing with his sleight of hand tricks. After the entertainment, door prizes were distributed. Art Starrett won a set of drills, Herb Ramsdell won a blanket and did an impromptu war dance. All the boys got a prize and a few lucky ones got two. A rising vote of thanks was given Henry Merrill for his excellent work in supplying the evening's entertainment.

Tri-Cities

At a meeting of the Tri-Cities Chapter, American Society of Tool Engineers held at the LeClaire Hotel on January 8, 1941, Professor Caywood of the University of Iowa at Iowa City explained to the Tri-Cities Chapter that the University of Iowa had been appointed to sponsor the government educational program in the Tri-Cities Area. This program will train tool designers and Tool Engineers. Professor Caywood has been appointed by the University to supervise the arrangements for this program locally. According to Professor Caywood, no complete plans have been made, however, it is believed that the course will be a 16-weeks concentrated instruction divided into several classes, depending upon the instruction desired and the number of men desiring this instruction. The proposed course will be financed by the Government, with the exception of the cost of text books. Instructors for the course have not, as yet, been selected. However, efforts are being made to secure the best possible men qualifying as experts in the field of tool designing and Tool Engineering.

THE Passing Parade

D. A. Wallace, President, Chrysler Division, and 'father' of the Superfinishing process has been appointed by the A.S.T.E. to represent that organization on the committee dealing with the classification and designation of surface qualities of the American Standards Association.

Ray H. Morris, for the past eight years with Hardinge Brothers, Inc., of Elmira, N. Y., has been elected Vice-President of that company and will be in charge of the Hartford branch. Mr. Morris is a member of the A.S.T.E., the A.S.M., and the Hartford Engineers Club.

ASTE'er Morris
Becomes a vice president.

M. K. Peck, William Sellers & Co. representative in the Cleveland Area has been recalled to the home office to aid in production problems involved in the orders in connection with the defense program.

Clifford E. Ives, head of the Ives Engineering Laboratories, reports that they have moved into new quarters at 216 N. Clinton Street, Chicago, Ill.

James R. Weaver has been appointed manager of the government ordnance plant which is now being built in Louisville, Kentucky, and which will be operated by Westinghouse.

R. V. Gavert has been named manager of the Canton, Ohio ordnance plant, also to be operated by Westinghouse.

Ampco Metal has recently promoted a number of sales engineers. J. K. Bybee will handle the Michigan territory, E. A. Svoboda has been transferred to the In-

dianapolis office. W. B. McKenzie and A. J. Reynolds have been transferred to Chicago. H. R. Gordon takes over in Boston.

George W. Frick has been made manager of the newly created Firthite Division of the Firth-Sterling Steel Company. Mr. Frick was manager of the company's Ohio district for nine years.

Edward D. Gangwere has been appointed director of equipment of the Westinghouse Company. In his new position he will co-ordinate the selection of equipment used throughout the various plants of the company.

Leonard S. Parker, for a number of years superintendent of production for Skilsaw, Inc., has been named Vice President in Charge of Operations.

Toolman Parker.
Also a vice president.

R. E. Zimmerman, Vice President of the United States Steel Corporation, was recently elected president of the American Standards Association.

Among the Tool Engineers placed in the new factory branches of Vascoloy-Ramet Corporation are Wilfred Pulver and Clarence J. Busch, who will be located at Milwaukee, C. W. Blade at Hartford, Conn., F. B. Sturm at Detroit, Sam A. Miniea and John Lee at North Chicago.

Francis A. Smith has been named general manager of the Sargent Company, of New Haven, Conn. He had been with the Greenfield Tap and Die Corporation for twenty years and was general manager at the time of his resignation.

James Y. Scott, president of Van Norman Machine Tool Company, has been elected president of the Community Chest board of trustees.

Derick S. Hartshorn, production engi-

(Continued on following page)

PASSING PARADE

(Continued from preceding page)

neer at the U. S. Armory in Springfield has been appointed works manager of the Babcock Printing Press Corporation in New London, Conn.

Terrence C. O'Donnell, works manager of Gilbert & Barker Manufacturing Co., has been elected a vice president and director. He has just completed 25 years of service with the company.

Died

Frank B. Hamerly of Aurora, 53, vice president of the Independent Pneumatic Tool Company of Chicago; of a heart attack while inspecting the company's Los Angeles plant.

Charles F. Drake, 45, Dayton representative of the E. A. Baumback Co., member of the Dayton Chapter of the A.S.T.E.; after a two weeks illness.

Harry Martin, with the Elwood Tool Company of Detroit; killed by lightning while visiting in Florida.

David Milne, 62, Machine Shop Superintendent of Farrell-Birmingham Company, Ansonia, Conn.; of a heart attack on Christmas morning. Born in Montrose, Scotland, he came to this country in 1907, after having worked for seven years in a Canadian locomotive plant. He was not only an excellent mechanic but also an exceptional leader of men. He was one of the first to recognize the possibilities of high speed steel and also did considerable work with tungsten carbide when it came out.

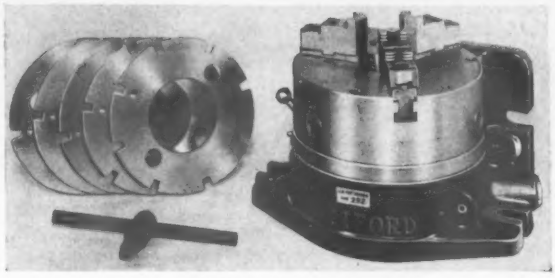
Frank E. Randall, 80, pioneer in the manufacture of dial gauges and precision instruments; following an operation for a ruptured appendix. He was a 32nd degree Mason, a member of the Order of the Eastern Star and the Waltham Gun Club.

Col. Franklin B. Richards, 78, internationally known metallurgist; after a brief illness. He retired in 1930 as a partner in the Cleveland iron concern of M. A. Hanna & Co. He had been director of many companies, and served during the last War as military assistant to Benedict Crowell, Asst. Secretary of War. At the time of his death he was living in Cambridge, Mass.

Charles H. Osborne, 60, factory superintendent of the Chandler Company of Springfield, Mass.

James F. Sloan, 52, toolmaker and designer; in his home at Worcester, Mass., after a brief illness. He had been an assistant to Prof. Goddard of Clark University, and had accompanied him to California and New Mexico for rocket and telescopic experiments.

Frederick H. Rich, 63, former general manager of Perkins Machine and Gear Company; at Springfield Hospital.



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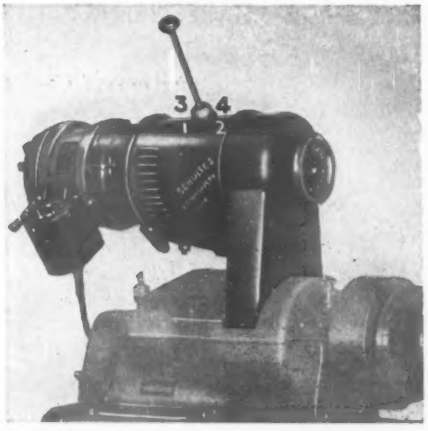

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February Meetings

BOSTON—Feb. 13. Dinner 6:15, Hotel Lenox, Exeter Street, Boston. H. B. Berry will speak on screw machines. E. I. du Pont movies showing the making of Neoprene. Election of officers. Floor Show.

CALIFORNIA—Feb. 13. Scully's Cafe 7 p.m., 4801 Grenshaw Blvd., Los Angeles. H. F. Lenz will speak. Quiz Program.

CLEVELAND—Feb. 14. Hotel Allerton, Chester & E. 13th St. 6:30. J. Karash of Reliance Electric & Engineering Company will show slides of Western National Parks. Reservation: Wm. J. Reiff, Jr.
NOTE: The Special Tool, Die & Machine Shop Institute of Northern Ohio, will hold their 4th Annual Dinner Dance, March 8th, 1941 at the Cleveland Hotel. Reservation: J. R. Fitzsimmons, Die Supply Company.

DAYTON—Feb. 10. Dinner 6:30, Hotel Gibbons. Election of Officers. Information on the 1941 Machine & Tool Progress Exhibition in Detroit.

HARTFORD—Feb. 3. 8:00 City Club, Hartford. F. W. Curtis, Chief Engineer of Van Norman Machine Tool Co., Springfield, Mass. will speak on "Jig & Fixture Design."

INDIANAPOLIS—Feb. 27. Dinner 6:30. Meeting 8:00. Warren Hotel. W. H. Wills, Metallurgist for Allegheny Ludlum Steel Company will speak on the Manufacture and Applications of High Speed Steels. Movies will illustrate. Reservation: R. D. Harris, 4201 E. 35th Street, Indianapolis.

MILWAUKEE—Feb. 13. Dinner 6:30. Meeting 7:30. Mr. Friedman, V. P. National Machine Co. will give an illustrated talk on "Manufacturing Shells for Defense." Reservation: Julius Riedl, Seaman Body Corp.

NEW YORK-NEW JERSEY—Feb. 11. 8:00. Robert Treat Hotel, Newark, New Jersey. Frank Sheeley, Stanley Gruchacz, Charles Thomson and Edward Murphy will conduct meeting on Die Design.

PEORIA—Feb. 4. 6:30. Endres Hotel, Peoria, Illinois. Harry Reynolds of Fafnir Bearing Company will speak on Bearing Types, Housing Design & Lubrication. Reservations: Everett C. Bowton, 412 Thrush Ave., Phone 2-6984.

PHILADELPHIA—Feb. 15. Penn Athletic Club, Philadelphia. Third anniversary. Exhibits open 10 a.m. Dinner 6 p.m.

ROCHESTER—Feb. 12. 7:45. University of Rochester, Lower Strong Auditorium. W. P. Rogers of U. S. Tool Company will speak on "Multi-Slide Presses & Milling Machines. Reservation: C. G. Newton.

ROCKFORD—Feb. 6. Dinner 6:30. Hotel Faust. Past President Carpenter of National Automatic Machine Company will relate some of his War Experiences and His Hasty Departure from France Just Before its Fall to the Germans. Reservation: Allis Chalmers, Main 6270.

SCHENECTADY—Feb. 10. 6:45. Y. W. C. A., Troy, New York. Reservation: N. Coxe, Bldg. 16, General Electric Company, Schenectady, New York.

ST. LOUIS—Feb. 13. 6:30. Melbourne Hotel, Grand & Lindell Blvd. Mr. Ellis will speak on Borizing, Precision Finishing of Surfaces.

SYRACUSE—Feb. 11. Dinner 6:30. Meeting 8:00. Syracuse Industrial Club. W. B. Ross, Open Forum Discussion on "The Subjects Which Bother Us Most".

TOLEDO—Feb. 11. Dinner 85c. 6:30. Toledo Yacht Club. "Askit Baskit" with Prizes. Reservation: R. H. Mogle, 3722 Leybourne Ave., Phone La. 8783.

TRI-CITIES—Feb. 5. 6:30. LeClaire Hotel, Moline Illinois. A. H. d'Arcambal, President of A.S.T.E. will speak on "Machinability of Metals".

WORCESTER—Feb. 10. Norton Company. 4:30 Trip through Plant. 6:30 Supper in Norton Cafeteria. Ray Cole, Experimental Engineer of the Norton Company will speak on "Surface Finishes as Developed by the Norton Company". Movies will follow.

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POSITION DESIRED—PLANNING & DEVELOPMENT ENGINEER, or work in the re-design of products and Equipment. Or as Tool or experimental department supervisor. Applicant is originator of patented mechanisms and devices. Six years tool and gauge, and Machine Shop experience. Other experience covers Tool and Die making, Tool and Die Designing. Research work in development of production equipment and methods.

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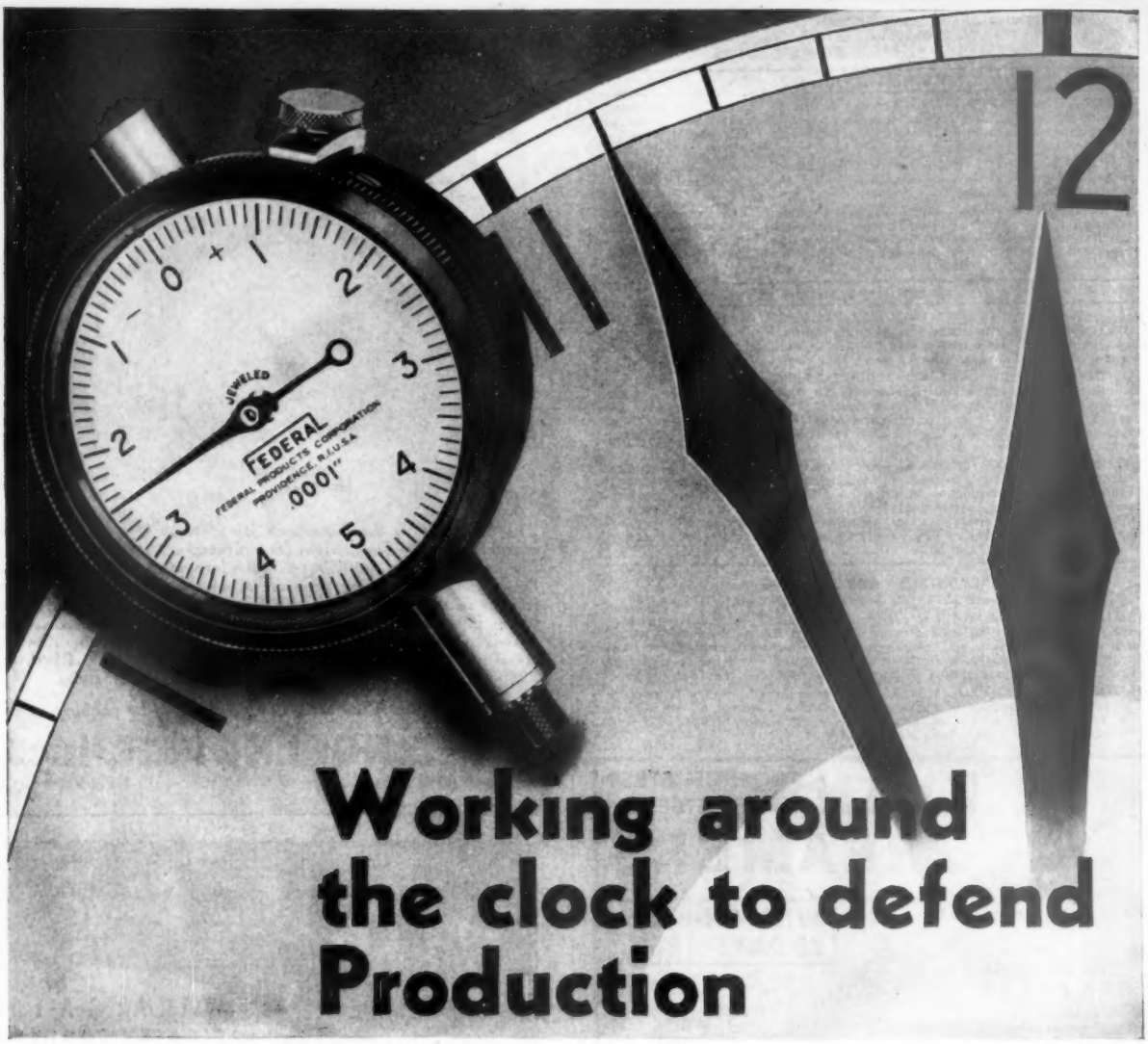

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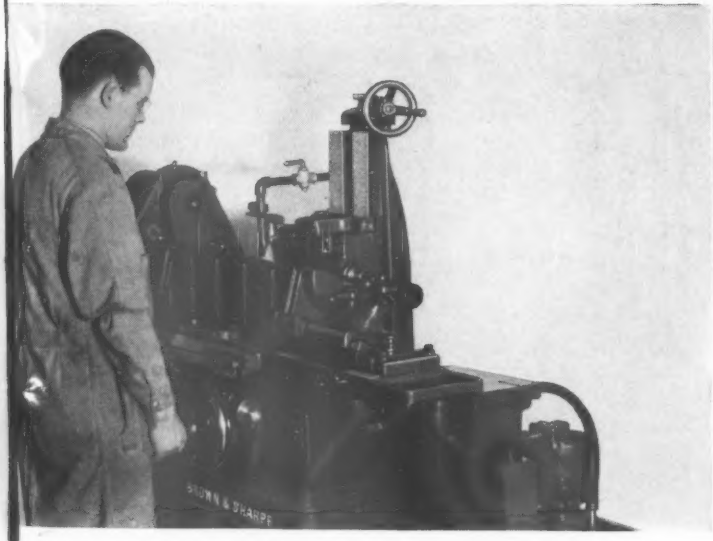

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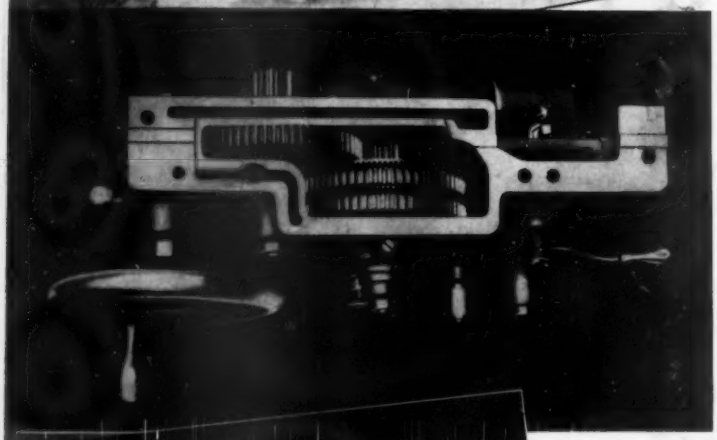

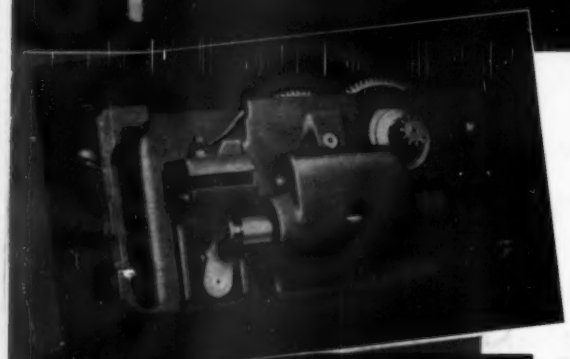

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